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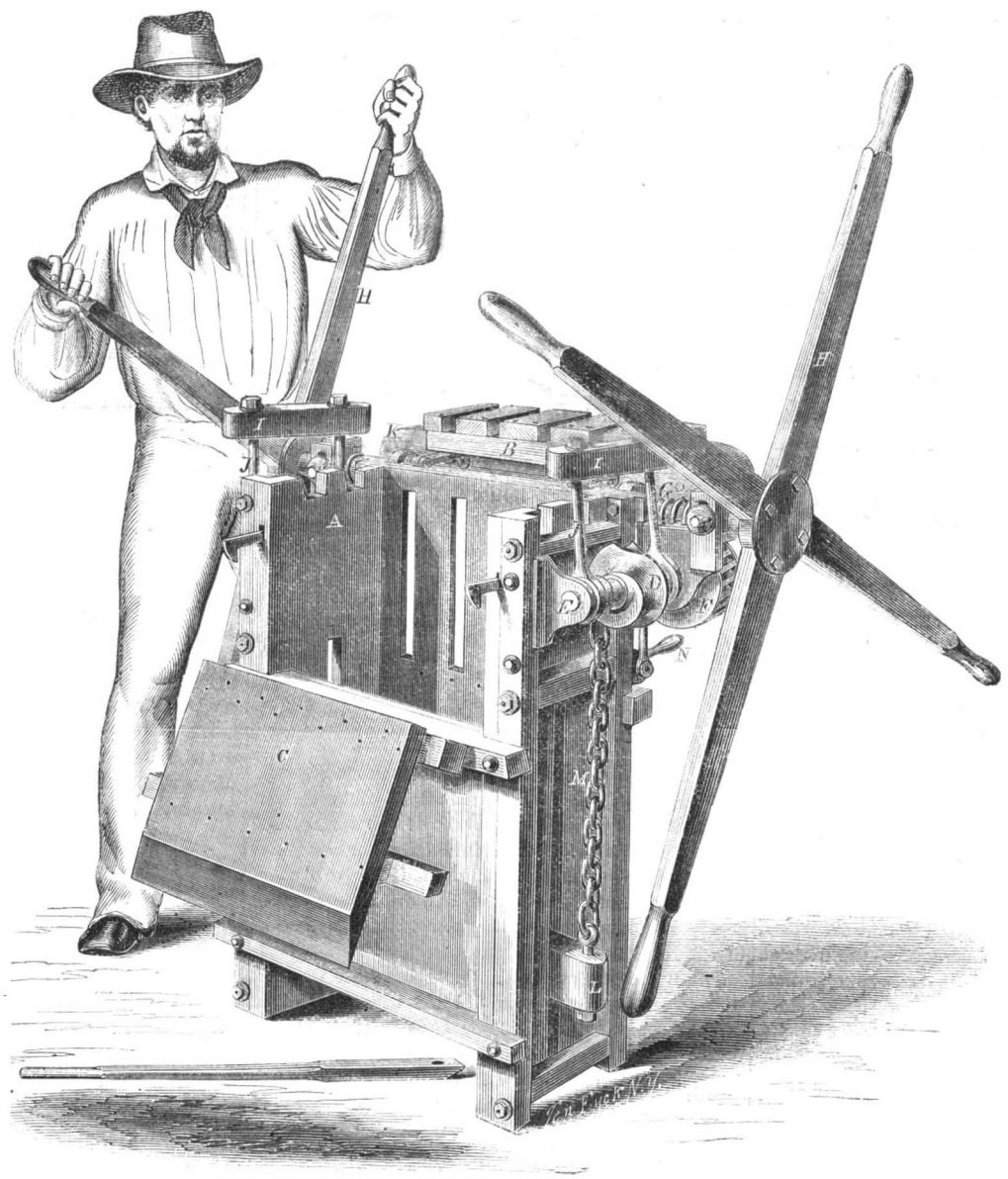
Improved Baling Press.

It is very important, in preparing certain substances for market, such as hay, moss, corn-husks for mattresses, straw, &c., that they should be compressed as small as possible in bulk, so that they may not occupy too much room in proportion to their weight. The engraving published herewith is an accurate reproduction of a new press for the purpose alluded to, and, as will be seen by the engraving and the following description, combines the most desirable qualities in the smallest compass consistent with strength of parts. The details of this machine are as follows :—



MILLER'S BALING PRESS.

The box, A, is of hard-wood, strongly bolted together; it is furnished with two doors, B and C, one on the side and the other on the top, which are both thrown open in the engraving to disclose the interior. The ends of the press box, A, are occupied by the power-transmitting machinery. This consists of two spiral wheels, D (one on each end), keyed fast upon the shaft, E; upon the other end of this shaft is the worm wheel, F, in which works the worm, G, attached to the shaft on which the levers, H, are secured. The clamps, I, are fastened to the swinging bolts, J, which slip over the spiral wheel shaft, and these clamps can be moved outward in order to let the top of the press come down; when in place they are slipped over the stout bar, K, on the top cover, and thus retain it in place when the pressure comes upon it. The follower cannot be shown as it is inside the press box; but the bar, L, is a part of it and connects with the stout chains, M, which proceed to the spiral grooved wheel, D. These are the principal details. The operation of the press is very simple. When the press box is filled with the material to be compressed, turning the levers at which the operator is stationed causes the chains to run up on the spiral grooves of the wheel, D, thus elevating the follower at the bottom and compressing the material in the box. It will be seen that the movement is well proportioned to the work, for when the hay is loose and easily pressed the follower runs up rapidly on the larger portion of the spiral wheel; but as the resistance increases, the power of the press is augmented by the difference between the large and small portions of the wheel, D; the motion is slower and the power correspondingly greater. The return of the follower after the bale is formed and bound is quickly effected; it is only necessary to throw the worm wheel out of gear with the screw by the eccentric and handle, N, when it descends by its gravity and the operation previously described is repeated. The small wooden bar on the ground is for convenient opening of the heavy top door. This press has been fully and satisfactorily tested; the inventor says he will warrant it to press one tun of hay per hour, and make bales in shipping order at a cost not exceeding fifty cents per tun. It was patented through the Scientific American Patent Agency on July 7th, 1863, by D. L. Miller, of Madison, N. J. Further information can be had by addressing him at that place.

CASE-HARDENING IRON.—A new method of case-hardening iron has been patented in Germany, by M. Martignoni. The process consists in rubbing the surface of the iron, while at a red heat, with the following composition :—5 parts of cow-hoof, reduced to fine shavings; 5 parts of quinquina; 2.5 parts of common sea-salt; 1.5 parts of saltpeter; and 10 parts of coarse black soap. This mixture is formed into a paste, and applied by a roller, on which it is smeared. The iron is subsequently tempered in cold water.

The Great Eastern---Her Repairs in New York---And the Ghost.

An interesting paper was lately read by Capt. Paton, of the *Great Eastern*, before the Mercantile Marine Association, Liverpool, in which he spoke of the great advantages of double-bottomed ships—remarking that a rent such as the *Great Eastern* had—90 feet in length and about four feet in breadth—was sufficient to sink any ordinary single-bottomed vessel. Yet, had it been actually necessary, she could have re-crossed the Atlantic in safety. The mode of repair was by an immense coffer-dam or caisson, 104 feet long, 15 feet broad, and 8 feet deep, placed under the bottom of the ship, over the fractured part, made to fit tight by the aid of a hose, and emptied of water by means of a steam engine. The men were thus enabled to work at the bottom of the vessel and repair the damage in the usual way, by putting in new plates, fixed together with heated rivets. The quantity of plating thus put on the ship was 800 superficial feet, and when she arrived at Liverpool the work was found to be so well done that this portion did not require re-plating. There was no instance on record of such repairs being done to a ship afloat under similar circumstances. He gave nearly all the credit of the plan (illustrated on page 403, Vol. 7, SCIENTIFIC AMERICAN, new series), and the carrying out of the varied and difficult operations connected with it, to Messrs. Renwick, engineers, of New York. Speaking of the operations of the divers, he said they had been materially aided by a newly-invented submarine lamp, enabling the men to see objects under water as distinctly as in broad daylight.

Captain Paton told an amusing ghost story in connection with the great ship. An impression got abroad that the ship was haunted, the alleged ghost being that of an unfortunate rivetter, who was heard plying his avocation in one of the wells or compartments. Before the vessel left this country he believed that one of the men employed in her construction was missing. The man was a rivetter; he was

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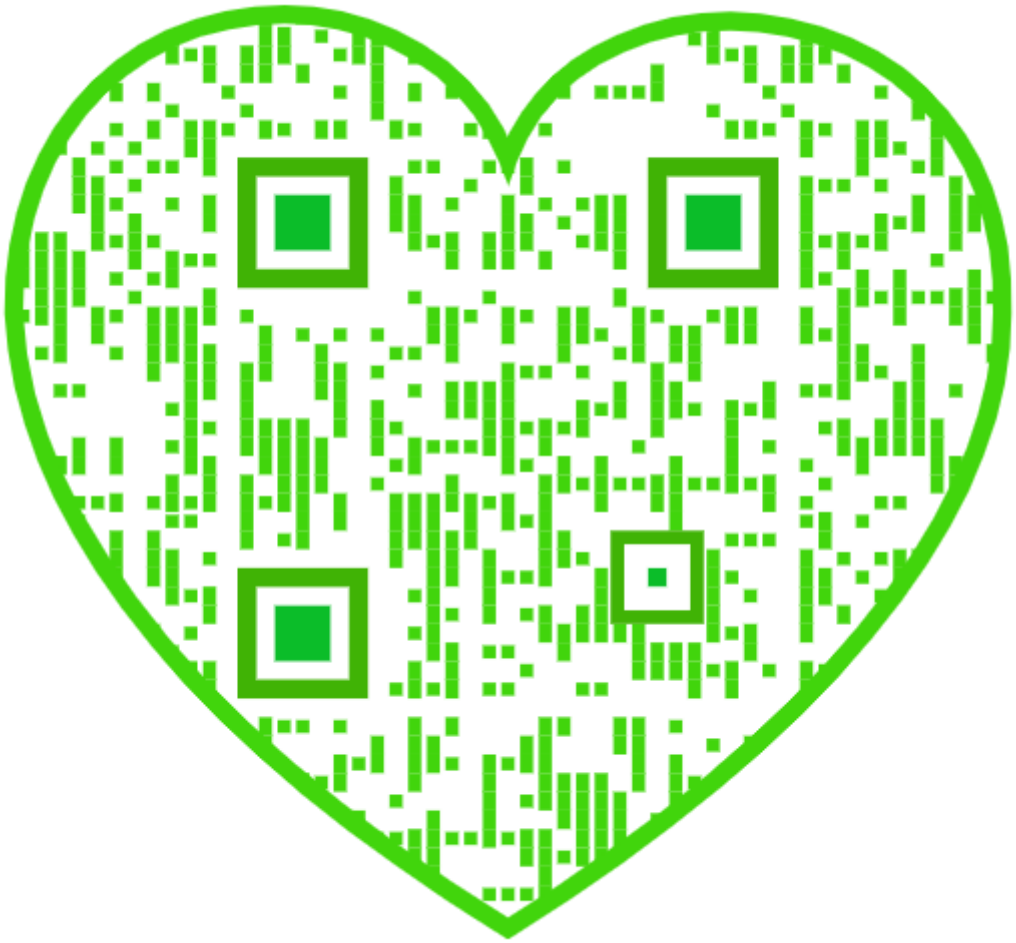

missed from the ship, and never came for his wages, the supposition being that he had been rivetted up in some part of the vessel. So firmly impressed were some of the men with this idea that they left the ship in consequence, and affirmed that they had heard their departed friend busily engaged rivetting in the middle of the night. The story was believed by many persons in New York, and on one occasion, while the ship was under repair, a diver signalled to be drawn up. He appeared pale with fright, and declared the ghost of the rivetter was busy in the bottom part of the ship; in fact that he began rivetting immediately over his head. Such was the consternation amongst the divers that they called in the aid of one of the spirit mediums, who are somewhat numerous in the city of New York. The medium came on board the ship, and, after an examination, declared that the missing man was there both "in body and spirit." Fortunately he (Captain Paton) by pure accident was enabled to dispel the illusion. Being in a boat near the bows of the ship, he discovered that a swivel connected with the moorings worked to and fro, the movement causing a chink, or vibration, which at times, more especially at night, was heard throughout the vessel. It was this sound which had conjured up, in connection with the supposed fate of the unfortunate rivetter, the phantom, whose mysterious doings spread such consternation on board the big ship.

SOUTHERN OPINION OF MECHANICS.

If there be any well-meaning but deluded mechanics among us who have advocated the cause of those now in arms against the Government, and have sought by all the means in their power to disparage the efforts of our people to subdue those who would destroy this country utterly and forever, we beg them to read the following extracts from the Richmond *Examiner*, and ponder upon the animus or spirit which prompted the paragraphs alluded to. What can be the future of any nation or country which so despises operatives of all classes? Disaffected workingmen at the north, who pine for a more intimate association with rebels, should read carefully the extracts appended. We quote:—

"Even before the war the so-called 'workingmen' had their candidates in our larger towns; and since the war we have seen in the very Capital of the Confederacy an appalling display of mechanic 'goosery,' which nearly frightened our worthy Representatives out of their propriety. Indeed, such is the arrogance of the few artisans of the South, that well-meaning men, who, a few months ago, reveled in visions of the future development of the material resources of Virginia, stand aghast at the sequel of their dreams as they foresee the whole 'chaos come again' of a corrupt civilisation; all the ——isms of the North, all the ——ologies of Germany, the phalansteries of the French communists, the extravaganzas of English radicals, running riot through our Southern country. Mills and manufactories on every stream and in every valley would be a poor compensation for the introduction of such a crew of the sons and daughters of Belial; and no wonder that those who cling with love, which is often the highest reason, to the old framework of our society, shudder at the thought of a Lowell on the Appomattox, or a Manchester in the Piedmont region. And yet they see no other future for the Border States of the Confederacy. Slave labor is to be withdrawn from the northern side of the James, and the country is literally and metaphorically to go to grass. The old lords of the soil are to migrate to the far South, and Yankees and Yankeefied Southerns are to dye the rivers of Virginia with indigo and copperas, and make her skies black with the smoke of her furnaces. Then the fatal process which led to the dissolution of the old Union is to be repeated, and another fratricidal war inaugurated."

"The old framework of our society" means of course slave labor. In another part the rebel editor says:—

"But suppose, for the sake of argument, that after the war is over manufactures will be found to pay in the South. Even then we are not disposed to admit that our social system will necessarily undergo a radical change, and we shall be forced to import laborers from abroad, and with those laborers the germs of Red Republicanism and its kindred tares. An easier solution of the problem is found in the advanced intelligence of our slave population, who are, in some respects, not a whit behind the operatives of Lancashire. When the blacks cease to be profitable in the field we can transfer them to the workshops; and the more elaborate the fabric the more minute the subdivision of labor—the easier will be the management of the race, the less the danger from the thievish propensities of this peculiar people. Everybody knows, although everybody seems determined to blink at the disagreeable fact, that of late years all the higher order of slaves, such as domestic servants and mechanics, have been bent on the acquisition of money, which they either hoard with senseless avarice or spend with reckless profusion. Hence we have said that such slave labor as may not be profitable in agricultural or domestic servitude should be employed in those manufactures which require a variety of independent processes, rather than in the more simple handicrafts for which alone negro operatives have been deemed fit. At all events, the capacity of the negro race for manufacturing operations, not simply for the heavy work of the foundery and the flouring mill, but for the production of delicate fabrics of every kind, deserves a series of careful experiments at the hands of those who wish on the one hand to see our system of slavery perpetuated and developed, and on the other to prevent the rise of a mere mechanical class; which, by its license, its half education, its narrow views, its low moral standard, has endangered every form of free government, and has always proved the worst foe to social order."

Even the corrupt governments of the Old World recognize and admit the claims of labor, and encourage industry in all possible ways, but this stupid editor is of opinion that when the war is over, and if their leaders had succeeded in their attempts, they would have been able to do as they chose with white mechanics. The tone of the extracts is worthy of notice by all artisans. They have reason to thank themselves that in the society they live, respectable mechanics are as much honored and esteemed as the highest officials in the land.

Manufacture of Pig Iron in Buffalo.

This branch of manufacture in Buffalo has already attained considerable magnitude, as the blast furnaces now in operation there are producing daily fifty tuns of pig iron, and some portion of the time during the season, it has been as high as seventy tuns daily. Allowing an average of sixty tuns daily, the yearly product will be 21,900 tuns. The works now in operation are being enlarged, and when completed the product from one establishment will be fully one hundred tuns of pig metal daily, added to which will be the daily product of a new blast furnace at Black Rock, now near completion, of say, 30 tuns daily. The total product of pig metal in Buffalo will be, next year, about 47,450 tuns. The following from the Philadelphia *Gazette*, giving the iron product of Pennsylvania in 1862, will show that the iron manufacture of Buffalo, although recently established, will compare favorably with that of the Keystone State.

The Board of Trade of Philadelphia state the product in 1862 to have been 381,448 tuns in Eastern Pennsylvania, against 313,000 tuns in 1861—an increase of more than 20 per cent. At the close of 1862, a large number of new works were started, and old ones were revived. In the Adirondack, in Massachusetts, in Ohio, and in Western Pennsylvania, every dormant establishment has been started in full vigor. Of Eastern Pennsylvania we know more definitely, and can safely estimate the aggregate at near 500,000 tuns, and the increase over 1862 at 20 per cent., while in other parts of the loyal States the increase is probably 25 per cent. In 1862 the Lake Superior region sent out $12,000,000 worth of copper and iron; of iron, pig and ore, 150,000, and of copper 9,300 tuns. In 1860 the production was double that of 1859, yet less than 120,000 tuns of iron and iron ore, and in 1861 but little more than half the aggregate of 1862. The reports already made of the business of 1863, sufficiently show that both copper and iron from this region will be largely in excess of 1862.

The movement of iron ore from Lake Superior, as given above, indicates the progress of the iron trade in the Lake Superior regions—and this, on the opening of the new line of railway from Marquette to Little Bayde Nocquet, will be largely augmented, and the raw material will be much cheapened. The future of Buffalo in the development of this branch of manufacture is most propitious, and a few years hence the iron product will be more than doubled.

New Time Calculator.

A very remarkable time calculator, called a "Perpetual Indexed Almanac or Office Calender," and invented by Mr. William Gibson, of South Granby, Shefford, C. E., was shown at the recent exhibition in Montreal. It marks the dates and days of the week in plain figures and letters, and will indicate in a few seconds the name of the day upon which any particular date will fall in the future, or has fallen in the past, however remote. Although literally a "wheel within a wheel," it is yet very simple, consisting of two circles, one of course revolving within the other. Its usefulness to the merchant, arithmetician, and indeed to any one that, unlike the poet, "takes note of time," cannot be questioned. The following problems, solved by it in a few seconds, will give some idea of its almost inconceivable power:—

"Suppose a year so far advanced that it would take a line of figures of such a length to decipher, that the electric fluid would take a duodecillion of years to pass over the line of figures, of which year the four last figures are 4953—on what day of the week would the 10th day of June fall on that year? The answer is Sunday."

"To assist in explaining this problem, it may be stated that in order to point out the dates of a year having five inches of a line of figures to decipher it, so many of these Almanacs (called Perpetual) which point out dates for 100 years, would be required (supposing each Almanac to be one inch square and one-sixteenth of an inch thick) that they would cover over 4,590 worlds like this one mile deep; and it would take a man's labor 2,608 years to write a line of figures that the electric fluid would pass over in ten seconds of time."

Nonpareil Washing Machine.

The best recommendation we can give of this, is, that while we have tried fifteen or twenty kinds, this is the only one that our "help" continues to use without being *required* to do so. It acts somewhat like the old "fulling mill;" the clothes are put into the hot water, and beat by two poundere which constantly turn them over. The beaters are moved alternately by a crank, provided with a balance wheel which adjusts the force required so as to make the turning easy. Take it all in all, the Nonpareils is the best Washing Machine we have found. If we could find a better one, we should put it in our list, for anything that helps to reduce the hard work of washing day, is a godsend.—*American Agriculturist.*

[An engraving of this machine was published on page 232, Vol. V., Scientific American (current series). We have had one of these machines in use for the last year, and our experience fully confirms the above statement.—Eds.

The Patent Office Operations.

The following is a summary of operations of the Patent Office from October 1, 1862, to September 30, 1863, inclusive:—

Applications received from October 1, 1862, to Sept. 30, 1863, inclusive	5,133
Caveats filed during the same period	792
Applications for the extension of patents	62
Patents issued, including reissues and designs	3,887
Extensions granted	40
Applications on which patents had been allowed but not issued by reason of the non-payment of the final fee within the time prescribed by the law of March 3, last, about	370
Balance of money on hand October 1, 1862	$48,157 21
Cash received from October 1, 1862, to September 30, 1863	179,378 55
Total	$227,535 76
Expenses for same time	189,603 13
Balance to the credit of the Patent Fund October 1, 1863	$37,932 63

Bunches of grapes may be preserved all through the winter by simply inserting the end of the stem in a potato of the size of a hen's egg. The bunches should then be laid on dry straw, and turned occasionally.

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MISCELLANEOUS SUMMARY.

THE "WARRIOR" LIGHTED BY GAS.—The *Warrior* is undergoing a thorough examination in dock at Portsmouth. The *Times* says that many improvements have been recently made in the fittings of the vessel. Perhaps the one possessing the greatest novelty is the introduction of "ozone gas" into the engine room and screw alley. Two small copper reservoirs, holding about a quart imperial measure each, contain a supply of spirituous oil, which flows by a pipe, after the manner of a caged bird's water fountain, into a small copper-inclosed tray filled with sponge. Through this a stream of atmospheric air is blown by a pipe from a pump (the latter set in motion by a weight and pulley), which, passing out by a discharge pipe at the opposite end of the tray, goes direct to the burners. There it gives out a beautiful white light, with comparatively no heat. An apparatus for the supply of a dozen burners may be carried under the arm. It requires no gasometer, and its use entails no danger to the ship. It emits no smell when burning, nor does the vapor itself, when allowed to escape unburnt from the nozzle of the burner. Its use entails no attention beyond the winding up, once in 24 hours, of the small weight which sets the machinery of the air-pump in motion. Its cost is one-fourth that of the candles served out for use from the paymaster's stores of the ship.

A Glasgow paper announces "for sale by private bargain, the wonderful organ of James Watt, the illustrious inventor of the steam engine, made by his own hands for his own amusement, in the city of Glasgow, nearly 100 years ago."

The London *Mechanic's Magazine* says "the manufacture of American watches commenced within the last ten years in Waltham, as an experiment, has proved eminently successful. Unable heretofore to compete with the low-priced labor of European workmen, they perfected machinery by the aid of which watch movements are fabricated equal to the hand-made. The continued growth of this branch will diminish the importation of foreign watches, and may at no distant period earn for North America a reputation in this manufacture equal to that she enjoys in the kindred branches of clock-making. Gold and silver watch cases are now produced to a very large extent, chiefly in the cities of Philadelphia, New York, and Newark."

The new iron paddle-steamer *Will o' the Wisp*, 600 tuns, and 180 horse power, was tried recently on the Clyde. The builders had engaged to carry 200 tuns dead weight at the speed of 17 miles an hour, under a considerable penalty—the owners engaging to pay a premium of the same amount if the vessel exceeded that speed—Mr. Wilkie, engineer, Glasgow, being appointed umpire. With the above cargo the vessel accomplished the distance between the Cloch and Cumbrae Lights in 52 minutes 11 seconds, being over 18 miles an hour; consequently the builders have won the premium. The *Will o' the Wisp* was designed, built, and engined by W. Simons & Co., London Works, Renfrew. Probably a blockade-runner.

THE VAGARIES OF STEAM.—The curiosities, so to speak, of boiler explosions, are well set forth in the following paragraph cut from an exchange:—"A boiler in a sawmill at Fort Wayne, Ind., exploded on the 14th ult., nearly destroying the mill. The boiler passed through a barn adjoining the mill, killing a valuable horse, then through another barn, killing a cow, then through two apple orchards, doing much damage to the trees. One of the flues was blown nearly a quarter of a mile. A piece of the boiler struck and upset a kettle in which a woman was boiling soap, without injuring her. Fortunately no one was seriously hurt."

[The cow might object to the conclusion.—EDS.

MERINO sheep from Vermont have just been shipped for Australia. They were sent for by sheep farmers in the "bush" as the best that could be found anywhere—a compliment to the farmers of the Green Mountains.

THE new iron railroad bridge over the Ohio at Steubenville will be 1,890 feet long, have 8 spans 90 feet above the water, 4 of 225 feet, 3 of 310 feet and 1 of 820 feet. The aggregate weight is estimated at 28,335 tuns or 5,670,000 pounds.

COTTON.—The great demand for cotton and the high prices paid for it, have led to increased efforts in its cultivation in various parts of the world, and with good prospects of future success. According to a recent estimate of Mr. Ashworth, an English statistician, India will yield 1,550,000 bales during the ensuing year, Turkey 40,000, Egypt 300,000 bales, China, Brazil, and the West Indies, 483,000; while America is credited with only 100,000 bales. Messrs. Whitworth & Brothers of Manchester, make a much higher estimate than this, however, and expect 3,165,000 bales from all sources. Cotton is of vast importance to the whole civilized world. For many purposes, there is no other material that can take its place; and besides this so much capital is invested in cotton factories and machinery that an intense self-interest is manifested to increase the supply, so as to set all the factories which have been idle, or partially idle, for about two years, in full operation again. It is believed that there are now about 300,000 bales in Western Louisiana and Texas, which would be secured to the trade were these sections of the Gulf States subdued. About 3,344,000 bales are required per annum for the British factories. There was a fall of one penny per pound on Indian cotton at Manchester on Nov. 17, making 2½ pence decline from the prices that ruled two weeks before.

TRICKS OF WINE MERCHANTS.—The London *Grocer* says:—"Wine merchants who have not been long in the trade will derive considerable information on the ways and customs of preparing ports, sherries, and other wines for the English markets, and in astonishment many will read that not a drop of port or sherry wine reaches market without a large admixture of brandy, and every Oporto wine-grower declares that port cannot be exported without spirits. It is scarcely possible for wine to continue for many years in contact with the crust and cork without being deteriorated in bouquet; and it is a well-known fact that almost every third cork containing very old wine is decayed, and has a bad smell, which it imparts to the wine. Port, with all its strength, when it has been in bottle twelve, fifteen, or twenty or more years, has generally what is known as the 'bottle stink;' yet, with this bottle stink, if declared to be a 'real vintage 1820,' ten guineas will be a small price for it."

LOSS OF THE "ISAAC NEWTON."—A most shocking accident occurred on the 5th inst., by which upwards of ten persons lost their lives, and which also resulted in the total loss of the steamer *Isaac Newton*. a vessel running to Albany. The boiler of this steamer gave way in some part, at present unknown, and by the escape of steam and expulsion of coals from the furnaces, killed and badly scalded a great many persons. The accident occurred early in the evening and fortunately a steamer happened to be near, which at once proceeded to the wreck from which the flames were bursting in every part and rescued the survivors. The scenes on board are said to have been appalling. The vessel was valued at $200,000, and is a total loss.

HUGE ARMSTRONG GUN.—Recent British papers contain elaborate and highly-colored accounts of a new Armstrong gun of 13½ inches bore, 15 feet length, and weighing 22 tuns, which was lately tried at Shoeburyness with conical cast-iron hollow shot weighing 600 pounds. The charge used for it was 70 pounds of powder. Twelve rounds were fired and the London *Morning Post* states that with charges of 75 pounds its range is about ten miles. It is a muzzle-loader. In all likelihood all the breech-loading Armstrong guns supplied to the British navy will soon be discarded, as their breech-plugs blow out and they are unsafe.

HIGH-HANDED PROCEEDING.—A party of rebels recently embarked on the steamer *Chesapeake*, running from this city to Portland, and while off Cape Cod, on the trip to Portland, overpowered the crew and took possession of the ship. The second engineer was killed and thrown overboard, and the chief engineer wounded. The rebels took passage from this city and were probably a set of desperadoes or adventurers, who could be collected here at an hour's notice for any undertaking. This affair shows that necessity exists for a strict watch to be kept at all times on vessels of every class.

AERIAL LOCOMOTION.—M. Jules Seguin has brought before the Parisian public a project for aerial locomotion between the Place de la Concorde and the Porte de la Muette, on Moreaud's system. According to this arrangement, the balloon will be held captive by means of a steel wire cable, running over vertical pulleys at the point of departure and arrival. These so-called pulleys are really large cylinders or drums on which the rope is wound backwards and forwards by means of a steam engine. To the cable which performs the functions of a locomotive, is fixed a line, which conducts the balloon; this is the general idea of a system on which M. Moreaud has experimented with great success, employing small balloons. M. Seguin proposes to carry 250 persons at each trip, from the Place de la Concorde to the Bois de Boulogne, or about 600,000 persons per year.

THE RIFLED MUSKET.—In making the gages for the purpose of manufacturing the United States rifled musket, the Providence Tool Company worked up a set to nearly the size, but left a small margin to work off when they were to be tested by the standards at Springfield. The company hired a shop at Springfield, as they were not allowed to take the United States standards away, stocked it with men and tools and finished the gages at once up to the standard size required by the Government. In our article on this subject it was stated that the gages were sent back to Providence to be reconstructed; this was a misapprehension of the facts in the case, and should have been given as previously related.

AN OLD HORSE-SHOE.—An iron horse shoe has lately been exhumed in the diluvium at Abbeville, France, supposed to be a pre-Adamite deposit, and in which bones and skeletons of the Hudson's Bay beaver, elephant, &c., had been previously found mixed with flint arrow-heads. The flint implements were supposed to afford proof that man had existed in France long anterior to the period usually assigned for his advent—about six thousand years ago.

MR. CANTON, the President of the Medical Society of London, has been writing a volume on the *arcus senilis*, or old man's bow. This is a ring, or bow, or segment of a circle, which shows itself on the edge of the cornea or dark part of the eye, of which it is a fatty degeneration, and a never-failing symptom of bad health and a decaying constitution. The advantage of this discovery is, that persons having this symptom may pay proper attention to their health in time.

SENSIBLE ENGLISHWOMAN.—An accomplished English lady, in a recent contribution to *Fraser's Magazine*, says:—"If at any time I needed to find a gentlemen who should aid me in my little difficulties of travel, or show me a kindness with that consideration of a woman which is the true tone of manly courtesy, then I should desire to find a North American gentleman. They are simply the most kind and courteous of any people."

INCREDIBLE!—We learn from a "truly educated" engineer abroad that "if very heavy engines with imperfectly fitted bearing surfaces are run at high speeds there cannot be the least doubt that they will break down." It is to be regretted that this important fact has been so long withheld from the engineering community.

SOME articles intended to be transmitted in the English mails, but which were not forwarded by the officials, are thus described by a cotemporary:—Two canaries, a pork pie from Devonport to London, pair of white mice, leeches in bladder, bottle of cream, sample of cider, a roast duck, a loaded pistol, fish, reptiles, &c.

MASSACHUSETTS PIANOS.—The *Commercial Bulletin* states that the piano-forte manufactory of Messrs. Chickering & Sons, Boston, is "the largest building in the country, except the capitol at Washington," and that about fifty pianos are manufactured weekly at the establishment.

WHO MAKES MATCH SPLINT MACHINERY?—A number of inquiries on this subject have been made at this office latterly. Manufacturers of such machinery will do well to advertise in the SCIENTIFIC AMERICAN.

LOUIS NAPOLEON has ordered twelve light steam plows for the imperial farms in France. They will range from two to five horse-power.

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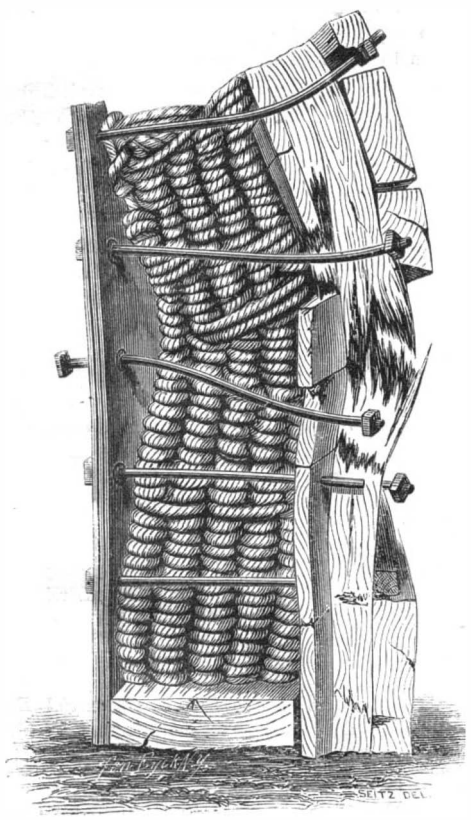
ARMOR PLATES FOR SHIPS OF WAR.

No more vitally interesting or exciting question than that of rendering ships of war shot-proof exists in the mechanical, naval, and, we may add, ship-building professions. By the courtesy of Commander H. A. Wise, of the Ordnance Department, Washington Navy Yard, we are furnished from time to time with accurate reports of artillery practice, on the several systems of armor-plating experimented upon at the Washington Navy Yard. These are correct reports, not altered or changed in any respect from the copy furnished by the Government, and we call the especial attention of our readers to the results as herewith presented. The subject of the appended engravings is Mr. Hodge's target, composed of wire rope or cables, placed behind a wooden facing of a certain thickness. The first engraving represents the target as it stood when fired at, the second a side view of the same target, and the third a rear view of the same target. The official report is herewith submitted. It is proper that we should add



that these illustrations will be continued in future numbers of the Scientific American, showing the effect of shot upon targets of all descriptions, faced with rubber, backed with rubber, wood, &c. &c.

PRACTICE AT Mr. HODGE'S WIRE TARGET No. 1.

[OFFICIAL.]

Pencote Battery, May 7, 1862.

The front of the target consists of three thicknesses of half-inch plate iron, then comes a tissue of wire ropes 14 inches thick. The target is mounted on timber 9 inches thick, consisting, first, of two 1-inch boards (one horizontal and one vertical), and then of two layers of timber 3½ inches thick, disposed of vertically and horizontally.

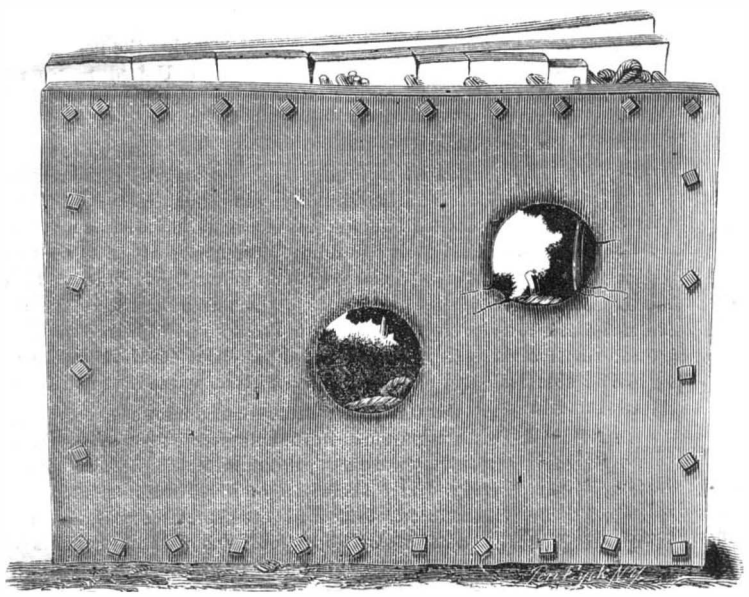
Dimensions of Target.—Length, 67½ inches; width, 50½ inches; iron thickness, 15½ inches; timber, 9 inches.

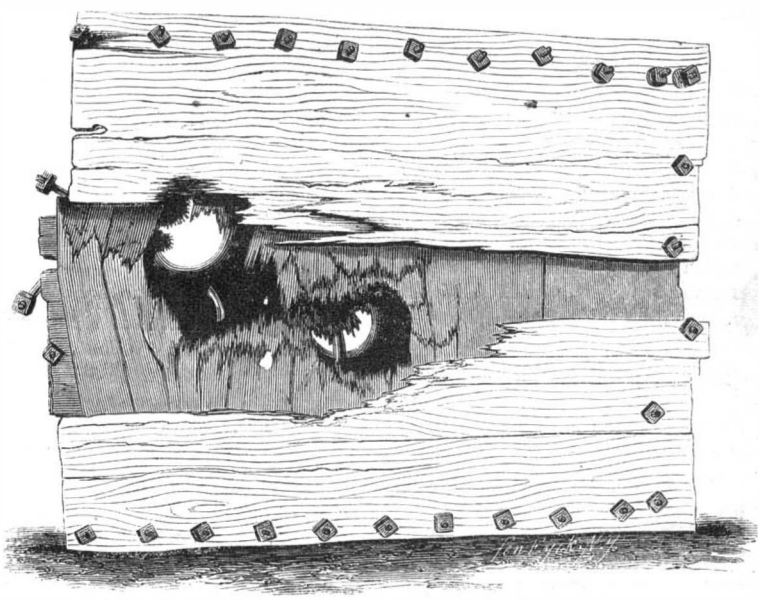
Gun, XI. inches, No. 214, C. A. & Co., mounted on wooden pivot carriage in front of battery; charges, cannon powder, 1862. Projectiles; first, one wrought-iron, and, second, one cast-iron solid shot. Primers friction.

No. from Gun.	No. to-day.	Charge.	Weight of Projectile.	Insert'n.	Recoil.	Time Fired.	Distance to Target.	Remarks.
		lbs.	lbs.	in.	ft.	P.M. h.m.	ft.	
101	1	25	156	106	7	11.28	83	
102	2	15	165	108	6	11.39		

First shot hit direct, passing clear through the target into the bank. Penetration not determined.

Second shot hit direct, passing clear through the plate and penetrated the bank a distance of 9 feet 6 inches.

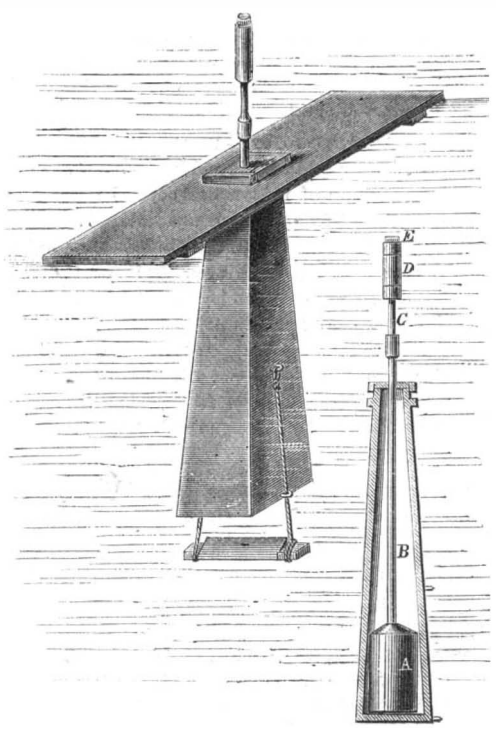




A NEW REBEL TORPEDO.

Navy Ordnance Yard,
Washington City, Nov. 21, 1863.

Commander H. A. Wise, *Chief of Bureau of Ordnance, Navy Department*:—



Sir:—Conforming to direction contained in telegram of Nov. 19th, I beg to report about the torpedoes brought up by the *Mount Washington* from Hampton Roads, as follows:—

These torpedoes are, in material and workmanship, rather inferior; however, would seem to answer the purpose of exploding a certain quantity of gunpowder under water. They are made of tin and are encased in square wooden boxes indicated by the engraving. In the lower end of these boxes hooks are driven, to which pig iron is fastened which keeps the torpedoes in their upright position.

The cylinder, A, holds about 25 lbs. of gunpowder, which is lighted by quick-match leading up through the tube, B, to slow-match, with which the smaller tube, C, is filled. The tube, C, is of two thicknesses of tin, which are sliding in each other, and by this means can be lengthened, so as to constitute a time fuse.

The cylindrical tube, D, is nothing but a common night-lantern of tinner's make: it protects the burning match from being extinguished by the waves, conceals the light and supplies oxygen to the combustion by means of the small smoke-stack, E.

Most likely they were set adrift intended to be carried to the ship's sides by the action of the tide; a plank five feet long, floating on the water, giving the direction to the torpedo.

Respectfully submitted,
(Signed) Wm. N. Jeffers,
Inspector of Ordnance.

REPORT OF THE CHIEF OF THE BUREAU OF ORDNANCE.

Bureau of Ordnance,
Navy Department, October 20, 1863.

Sir:—In your last annual report, under the head of "bureaus," you were pleased to make the following remarks:

"Like every other branch of the public service that of ordnance was wholly unprepared for the great crisis that befel the country in 1861; and one of the most embarrassing difficulties at the commencement of our national troubles was that of procuring ordnance as rapidly as was required for our increasing navy. To remedy the deficiencies and wants when our vessels were multiplying, we were compelled for a time to revert to old artillery which had been discarded, and to avail ourselves of extraordinary means to meet the then existing necessities. These difficulties have been, in a measure, overcome, and our ordnance is greatly improved and improving."

In the report which I now have the honor to present, I shall endeavor to show briefly, yet as clearly as possible, how much this branch of the public service was unprepared for the great crisis of 1861, and in what manner and to what extent the existing difficulties have been overcome, and our ordnance of the navy increased in numbers and improved in character.

Not a single ship or squadron has ever been delayed in its movements for the want of ordnance or ordnance supplies.

From the record it appears that the ordnance of the navy, at the commencement of 1861, consisted

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of 2,468 heavy guns and 136 howitzers, of the following calibres: 32-pounders, 8-inch, 10-inch (old model), X inch (Dahlgren), X-inch (Dahlgren), and XI-nch (Dahlgren).

The old system of armament is represented in this able by the classes of 10-inch, 8-inch, and 32-pounders; the new system by the rifled pieces and the smooth-bore IX-inch, X-inch, and XI-inch guns of Rear-Admiral Dahlgren, and the rifled-guns of Mr. Parrott, to which are added the ponderous and powerful XV-inch guns introduced by Assistant Secretary Fox, as the special armament of the monitors and other turretted vessels.

Of the new system it is probable that over 700 guns of different calibers that are now in process of fabrication will be completed and added to the number given in the table by the end of the current year.

In arming our vessels the primary object has always been, recently, to place on board of them the heaviest and, consequently, the most effective guns which they could safely carry without reducing their speed, or endangering their sea-going qualities.

The only establishments in the country which were prepared for the work of founding heavy cannon when the rebellion took place were the South Boston, Fort Pitt, and the West Point founderies.

Right nobly did they come to the rescue in the hour of need, and thus afforded time for the bureau to seek other manufacturers who might be willing to undertake the work of supplying the navy with cannon.

In addition to the above-named founderies, the bureau has now, as sources of supply, the establishment at Providence, R. I., known as the Builders' Iron Foundery, the founderies of Messrs. Hinkley, Williams & Co., of Boston, and the Portland Co., of Portland, Me., and at Reading, Pennsylvania, the Scott Foundery of Messrs. Seyfert, McManus & Co.

In procuring cannon for the navy the same conditions have been exacted from all these founderies, as regards the character of metal and every other element necessary to constitute good and reliable guns. No gun has been accepted, as a *standard*, which has not been subjected to the ordeal of 1,000 rounds of service charges. With this standard thus established, all the guns of a contract must coincide in their composite elements.

The only exception to this rule has been in the case of the XV-inch guns cast upon the plan of Major Rodman, of the United States army. Time did not permit of this proof being applied, and the guns were necessarily accepted and put into service, after having endured, however, somewhat more than the tests prescribed by the army regulations.

It is most gratifying to know that the judgment of the Navy Department has been sustained by the result of the further test which has been applied to the first gun of this class made for the navy, and which is still undergoing a series of experimental firings after being modified in form. All doubt is thus removed of the ability of the Fort Pitt foundery to produce guns of this great size which can safely be relied upon; and the power thereby added to the force of our monitors has been most fully exemplified in the capture of the *Atlanta*.

In the summer of 1862 the bureau, in conjunction with the army ordnance, directed a 100-pounder Parrott gun to be subjected to a series of 1,000 service rounds.

The gun stood the test without bursting, and its accuracy and range were considered sufficiently good to warrant the adoption of these rifled guns as a permanent part of our naval armament.

Finally, from personal inspection, and witnessing the firing of over one hundred rounds from these guns at the West Point foundery recently, the bureau is satisfied that whenever attention is paid to details and even moderate skill in the manner of loading and firing is attained, they will prove the most serviceable rifle guns that have ever been introduced into any service.

It should be remarked also that the average cost of these guns is much below that of any others which have been offered to the Government.

The projectiles now commonly used in the navy may be divided into two classes, the smooth and the rifled, and are used almost exclusively in their respective guns.

For the smooth-bores we have the shot, shell, shrapnel, grape, and canister, and the same for the rifles, excepting the grape and canister, which are not generally provided. The former are spherical; the latter elongated and of different forms and devices, as embraced in the systems of Parrott, Hotchkiss, Schenkl, and others.

It is hardly possible to state with exactness the number of each kind of projectiles on hand and available March 1, 1861. Since that time upwards of 5,170 tons of shot of all classes have been provided for the use of the navy.

Since the outbreak of the rebellion the navy has been amply supplied with powder from the various mills engaged in its manufacture in the loyal States, and has not been compelled to seek it in a foreign market.

So great has been the consumption for naval purposes that the bureau has been obliged to order no less than 2,980 tons since March 1, 1861. This vast amount has been promptly furnished, of the most approved quality, and in conformity with the established tests, by the Messrs. Dupont, of Wilmington, and the Schagticoke, Hazard, American, and Union Powder Companies. For uniform strength, density, and hygrometric qualities, no better powders can be found anywhere.

So far as the navy is concerned, the above-named mills are fully capable of supplying all the demands.

The same difficulties were experienced in supplying the navy with small arms at the commencement of the war as with heavy guns; for it had been customary to rely mainly upon the army for the limited number required in the ordinary operations of a time of peace. The navy was, consequently, obliged to make use of every available description of arm in its possession, and to buy at once such as could not be obtained from the army.

Hence the present stock is made up of a number of different styles and calibers, partly breech-loaders, and the want of uniformity in this respect is felt to be very embarrassing.

The proposition will be to adopt one caliber of musket and one of carbine—the former being a muzzle-loader, the latter a breech-loader for boat service; and this it is at present believed will be best obtained by using altogether the "Plymouth" pattern of musket (ten thousand of which are now being delivered by Mr. Whitney, of Connecticut), and the Sharp & Hankins breech-loading carbine.

The powder magazines for the use of the navy on the Atlantic border are now situated at Portsmouth, N. H.; Boston, New York, Fort Mifflin, on the Delaware; Washington, and Fortress Monroe.

The capacity of the first five named is about 500 tons each; of the one at Fortress Monroe 3,000 barrels. At Baltimore there is also a small magazine rented from private parties which will contain about 200 barrels.

In times of peace, although danger still existed, the chances of disaster were very much reduced because the magazines contained moderate quantities, and were only required to be opened and work performed in them to supply occasionally the wants of a cruiser. Now the demand for powder and magazine stores is unceasing, and the chances of disaster are multiplied proportionally.

The importance of this subject will be sufficiently felt by reflecting on the terrific consequences of the explosion of five hundred tons of gunpowder in the vicinity of a city like Boston, New York, or Philadelphia. Words can hardly do justice to the disastrous effects of such an event. It would level spire and dome with the earth, and shake either of those cities to their very foundations. By an explosion of a far less quantity of powder than that named, an entire quarter of the city of Leyden was destroyed in 1807, and 150 persons perished in the ruins.

It will be seen from the foregoing brief and imperfect account of the state of our naval ordnance at the commencement of the rebellion, and of its present condition, how great an advance has been made in placing it not only on a footing commensurate with our present necessities, but als in preparing it for further and more extended operations; and it may be said that in general efficiency it now equals, and, in some respects, far excels the ordnance of any other navy. The record of its rapid progress during the past two years from comparative weakness in numbers and appointments to power and unrivalled excellence, is but another evidence of the vast resources of the loyal States, and of the skill, energy, and patriotism of their inhabitants.

H. A. Wise, Chief of Ordnance.

The "Warrior" in Bad Condition.

We find in the London *Times* the following account of the condition of the frigate *Warrior*, from which it appears that that famous vessel is practically useless for the present:—

"The ship's bottom, as she now lies in dock, has the appearance of a well-made thrummed-mat, being covered with a fine crop of tuft-weed, which must have grown at the rate of about three-quarters of an inch per month, since the ship has been afloat, to reach its present condition. The vitreous sheathing had less of this weed upon it than the compositions, and they have adhered to the ship's bottom with two exceptions.

"It is impossible, however, to say how far these small plates (which are about twelve or fourteen inches in length and about four inches in width, and are attached to the ship's bottom by a hot cement) have protected the iron until they have been removed, and the surface has been laid bare and examined. The same remark will also apply to the compositions, for there are signs of corrosion over the lines of rivet heads at the ship's bows that require to be very closely looked into. There are existing indications of mischief to the rivet-heads at the bows of the ship to warrant a careful scraping and examination of every part of the ship's bottom from keel to water-line."

Cornish Pumping Engines.

It appears from a tabular statement prepared by the proprietor of *Lean's Engine Reporter*, for the years 1841 to 1860 inclusive, that the average duty of these engines has fallen off from sixty-eight millions in 1844 to fifty-two millions in 1860, or 25 per cent; also that less interest was now felt in the performance of these engines, as while fifty were reported in 1841, only fifteen were reported in 1858, and twenty-five in 1860. Although the nominal, or reported duty, showed this marked diminution, it was not asserted that there had been an actual falling off to the extent thus indicated—for the duty paper did not take into account the quality of the coal, which was certainly inferior to that used twenty years ago; besides which the present practice of sinking the engine shaft, for the whole, or part of its depth, in an inclined direction upon the course of the lode, must have tended to increase the friction of the pitwork, and the mines were also deeper than formerly. Nor was expansion of steam adopted to so great an extent now as it was some years ago; it was then carried further than was compatible with safety, as was evidenced by the repeated breakages of the main rod, the piston rod, and the other principal parts of the engine. But after allowing for all these legitimate causes of the falling off of duty, it was thought that the average duty of the county was still at least ten millions below what it should be.

Safety Valves Dangerous.

The London *Engineer*, in alluding to our remarks upon Professor Airy's paper on boiler explosions, says: "It is dangerous to open a large safety valve suddenly." The general idea of safety connected with the use of a safety valve is that when the steam in the boiler attains to a certain fixed rate of pressure, it shall open suddenly and allow the steam to escape so as to reduce the dangerous pressure. It is known to engineers that if a safety valve is raised suddenly, under great pressure, the water is liable to foam and flow out with the steam, in the same manner that soda-water or spruce beer in a bottle, charged with carbonic acid gas, will be carried out with the gas when the cork is drawn. It is upon this principle seemingly that Clark has founded his projectile theory of boiler explosions. No other danger is entertained by engineers in raising the safety valve suddenly than the escape of water from the boiler.

Something for the Photographers.—In consequence of a prize having been offered in France for the invention of a substitute for albumen prepared from hens' eggs, an albumen equal in quality, and much cheaper, has been discovered, which is made from fish roe.

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Correspondence

Rifled Ordnance and their Projectiles.

[For the Scientific American.]

Rifled guns and projectiles adapted thereto, have for many years been the subjects of careful investigation and experiment, by persons of high scientific attainment in the art of gunnery; many important and valuable improvements are the results of their study. Lately the attention of American inventors has been directed to rifled ordnance, by the dire necessity of using (and the consequent increased demand for) the best and most efficient weapons of the class discussed.

As yet no particular plans have been decided upon as the best to be observed in general rules for rifling guns or the conformation of their projectiles, Believing as we do that all facts and practical information bearing upon the subjects alluded to have their value, we are induced to offer, as the result of many careful experiments, much practical observation and labor, a few suggestions in relation to the matter here considered.

The great end to be obtained by the employment of rifled guns is acknowledged to be accuracy, velocity of projectile, and great length of range, with the least possible liability to burst, strain, or injure the gun, as well as the most economical use of the charge. It is well known that a certain degree of velocity in rotation is necessary to give accuracy to the projectile, and that it requires power to produce that rotation; also that a body moving in a right line receives rotation more readily and with less expenditure of power than a similar body at rest; also that the greater the resistance offered by the projectile to the propelling power the greater the liability to burst or injure the gun. Hence in order to accomplish the ends sought and previously set forth, and to apply, economically, the force from the agent employed to propel the projectile, we claim that it is necessary that the rifling of the gun should be gradual and progressive from the breech to the muzzle, ending by giving to the projectile at its exit from the weapon a proper velocity of rotation. Such motion, we are fully satisfied by many practical tests, as a general rule, should be equal to one revolution of the projectile, in from ninety to one hundred diameters of the bore of the gun for all ordnance of less than 4½ inch caliber. In no instance should said rotation be more rapid than that of one turn in every ninety diameters. For larger ordnance the velocity of rotation should be less than that just named, but in no case should it exceed one revolution in every one hundred diameters. We are aware that the length of projectiles has much to do with their capacity for retaining rotary motion, and that those which exceed twice their diameters in length require more rapid rotation than shorter ones; hence the greater necessity of adapting the length of projectiles to certain standard rules with reference to the speed of their revolution.

Numerous and thorough experiments, made by competent experts of the present day, have demonstrated most clearly that the rotation imparted to projectiles of suitable conformation, in accordance with the system of rifling guns herein proposed, is amply sufficient to secure the utmost accuracy and the greatest length of range; therefore the force ordinarily employed in accordance with the present recognized systems of gunnery in creating a higher speed of rotation is, to that extent, a direct and needless tax upon the propelling agent. A more rapid revolution than is absolutely necessary is also objectionable, from the fact that projectiles are liable to drift in the direction of their rotation and in ratio therewith; excessive rotation is therefore detrimental to accuracy as well as expensive in power.

In order to harmonize the length of projectiles with the best known system of rifling guns, before described, in such manner as to produce the most desirable results and to reduce the same, as nearly as possible, to a general rule, it is believed that projectiles for ordnance of small caliber should in no instance exceed twice their own diameters in length; and for guns exceeding 4½ inches in caliber, from ½ to 1¾ diameters is preferred; and for very large ordnance, in cases wherein great length of range is required, the projectile should not exceed ½ of its diameter in length.

Recent experimental tests have proved that projectiles of more than twice their own diameters in length are liable to tumble or change ends during their flight and before they reach their proper destination; also that the direct line of motion of such projectiles can only be sustained, even for an inconsiderable distance, by excessive rotation.

Now when we take into consideration that the long projectile must receive its rapid rotation from the excessive twist or rifling of the gun, and that in proportion to its weight it exposes much smaller superficial area against which the propelling force can act than the shorter projectiles, it will at once be seen that immense charges of powder are required, and that danger of injuring the gun is thereby involved. It may also be stated that the long projectile, moving with like velocity and rapidity of rotation, is more likely to deviate from its proper line of flight than the shorter ones.

This may be accounted for partially upon the hypothesis that the pressure of the air is not equal and uniform at the apex and at the base of the moving projectile; hence the longer the projectile, the greater the atmospheric leverage to overcome, to keep its horizontal axis parallel with its line of motion. Another argument in faver of the shorter projectile is that at the instant of discharge, it is seized by the gun at a point nearer its shorter axis than the longer one can be, owing to the location of the expansive portion of the projectile; its longer or horizontal axis is therefore more likely to receive direction in harmony with its line of motion.

In case we succeed by means of the system herein set forth in obtaining greater accuracy, higher velocity, and longer range (with less danger of injuring the gun) than have been accomplished by other methods, which we are convinced is the truth, then the plan is worthy of some consideration, and the object of these remarks will have been attained.

The Electric Wave.

[For the Scientific American.]

The electric current does not run in a line of narrow limits; neither does it run in a straight line. On the contrary it extends in a wave (as indicated even by an ordinary galvanometer) of more than a foot from the axis of motion. Be the essence of the electric force a fluid or whatever it may be, its direction is that of a spiral. These facts are demonstrated by the galvanometer, as follows:—

Put the single cups of a galvanic battery, about six inches apart, in connection in the usual way. Place the galvanometer in the direct line of the current, and the needle is deflected ninety degrees. In proportion as the galvanometer is withdrawn from this line, the deflection of the needle diminishes; till at length, at a distance of twelve inches from the line of motion, with an ordinary galvanometer, the needle ceases to respond to the electric impulse and remains at rest, north and south. Thus it is demonstrated that the wave or electric current extends twelve miles from the axis of its motion.

The spiral course of the electric current is shown by the different points of the compass toward which the needle points when the galvanometer is placed above or under its line of motion. To illustrate the subject, form a wire into a spiral shape in a deviation the reverse of that of a corkscrew. Now place this wire in a direction north and south, and suppose the course of the current is from south to north. If the galvanometer be now placed over this spiral wire, the needle is deflected to the east; if placed under, it will be deflected to the west. The same effects take place, of course, if the wire be straight. I introduce the spiral wire to illustrate the course of the current.

I think it is this same electric law that regulates the direction of those species of plants which grow spirally, such as the bean, the convolvulus, or morning glory, &c. These follow the electric law. You will always find them twining around the pole, string, or whatever it may be, just in the same direction as the spiral wire bent in the opposite direction to that of the corkscrew, and taking the very same course as that of the electric current. Doubtless it is this same electric force, passing around th earth from east to west, that causes the needle of the compass to point north and south. It is well known that when a rod of iron is made magnetic by a current of electricity being made to pass around it, through wire insulated with cotton, the poles of the rod thus magnetized are at a right angle with the course of the electric current.

I will now mention a circumstance which occurred to me some years ago, when I was engaged in making four or five hundred small magnets for miners' use in California, for separating the particles of iron from the gold. I made the magnets in a small room in which were shelves on every side of it. In making magnets the process requires several days. No more than a certain amount of magnetic virtue can be imparted to the steel on the first day—say four pounds. The magnets then are laid up on the shelves and the poles of each closed by a strip of iron, to prevent the diminution of the magnetic power. The next day the same process of magnetizing is repeated again, and several pounds weight more of magnetic weight is gained. In this way the process was repeated, day by day, till the maximum power was obtained, which was that of eight pounds. Now I noticed that every magnet which was placed on the shelf with its poles south, gained, during the twenty-four hours it remained in that position, about half a pound of magnetic power more than it had when laid on the shelf; while those which were placed with their poles east or west gained no more power. This was not accidental, because I repeated the experiment several times, and always with the same result.

Now it seems to me this fact indicates that there is a current of electricity constantly passing around the earth in a direction either from east to west, or from west to east. When the galvanometer shows us that the electric current passes spirally from east to west, the irresistible inference is that the electric current which passes around the earth is from east to west. The electric current of the earth, coming in contact with the magnet on the shelf, with its poles south, passes around it at a right angle with the axis of its poles, and thus magnetizes it; just in the same way that the electro-magnet receives its magnetic properties, by the current of electricity passing around it at a right angle with its polar axis. This is the way, too, that the vines to which I have alluded grow. If you want to know which way one of these vines will grow up around a pole you have only to place the spiral wire, bent as have described, alongside of it, and it will be found that the vine takes the same course as the spiral of the wire. This arises from the electricity in the earth following the same eternal law that governs the same element everywhere. From the earth it forces up the plant, and rises with it as the soul of that plant.

How philosophically incorrect is it to say that there are different currents in electricity. The difference produced by it is not because there are different electricities, or different currents in electricity but because the electric current, under different modifications, produces different results. Take, for instance, the chloride of lead; pass through it a current of electricity, and it is decomposed. The lead is liberated at the *cathode* or negative pole, and the chlorine at the *anode*, or positive pole. So again with water; subject it to the action of the electric current—it is decomposed, and its constituents, oxygen and hydrogen, are respectively liberated at the positive and negative poles of the same current. Then again, pass through a person a sensational intensifying direct current—say from the elbow to the hand—and at the same time a to-and-fro current from the other hand to the hand in contact with the direct current, and you feel two different intensities but it is the same current that produces these different intensities. The difference of the intensity arises from different modifications of the current made by the sudden change in its polarity.

In the above experiments it is evident enough to any one that the current which passes out at the cathode, or where the lead and the hydrogen are liberated, is the very same current that entered at the anode, where the chlorine and the oxygen were liberated, and where the sensational effect was considerably less energetic.

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It is a pity that on a subject so sublime and important as electricity and its concomitant, magnetism, there should be such vagueness and confusion of ideas. We have seen that all those different and wonderful effects just spoken of were produced by one and the same current. Why are we not, then, bound to admit that all the wonderful phenomena of electricity are from the same source, and that all these varied and wonderful effects are produced solely by the different modifications of the electric current and not by different currents?

SAMUEL B. SMITH, 429 Broadway, N. Y.

Greek Fire or Pyrophori.

Chemists are acquainted with several substances which take fire when exposed to the air; they are termed pyrophori or fire-bearers.

The liquid bodies, alkarsin and cacodyl, poured from a vial into the air, spontaneously take fire and burn with a white flame, evolving at the same time a most intense skunk-like stench, the very smoke from which is deadly poisonous. These deadly pyrophori would appear as though they had been pumped up from a well near the River Styx. There are also pyrophori of a grain or powder form: one of these is made by roasting acetate or sugar-of-lead in a close vessel, the other from alum and flour in the same way. We may keep them bottled up in safety, but only let the air come in contact and they become "on fire." These latter are by no means new discoveries, for a recipe for making them was published more than a century ago.

The exigencies of modern war have added to their number, and one in particular so dangerous and so inflammable, that it has been compared to the Greek Fire, with which the Byzantine twice delivered Constantinople from the sieges of the Arabs and Saracens, more than eleven hundred years ago.

The ancient Greek Fire is said to have been invented by one Callinicus, a native of Heliopolis, in Syria; its composition was held as a state secret. Gibbon observes—"The art of making it was preserved at Constantinople as the palladium of the state. All the weapons of war might occasionally be lent to the allies at Rome, but the composition of the Greek Fire was concealed with the most jealous scruple, and the terror of the enemies was increased and prolonged by their ignorance and surprise."

A knight, who despised the swords and lances of the Saracens, relates with heartfelt sincerity his own fears and that of his companions, at the sight and sound of the engines that discharged a torrent of fire.

The composition of it is now pretty well known to be naphtha, sulphur, bitumen and most probably niter. Vast quantities of naphtha or petroleum abound between the Tigris and the Caspian Sea; sulphur must have been common at Rome on account of the proximity to Sicily, where it is mined, and niter is a natural efflorescence on the shores of the Dead Sea. Chemistry was most assiduously studied in Egypt, so that taking into consideration that the natural products of the earth almost put into the hands of Callinicus the necessary materials, we are not surprised that with his alchemical skill the terrible war fire was compounded.

Yet if the brave and warlike Saracens were affrighted from their enthusiasm by this fire, which after all bears no comparison to the effect which a bombshell charged with gunpowder can produce, what would they have imagined if they could have seen the modern pyrophori? It will be seen that we are acquainted with bodies in the form of powder or grain which become fired when in contact with air; but we are now introduced to a true liquid fire, which, dashed over anything, spreads itself like water, then in a few minutes of insiduous attraction and evaporation, bursts into a flame in every part! This liquid is a solution of phosphorus in disulphide of carbon, which can be almost as easily and as cheaply made as gunpowder. Disulphide of carbon, a transparent spirit-like liquid, was discovered by one Lampadius, as far back as 1796. The making of phosphorus at a very cheap rate dates within a very recent period; the combination of these two bodies has resulted from the demands of present war.

We are inclined to be political in our remarks by observing that the more destructive the war agents are the shorter will the war be. The wars of the kings of Egypt, even of Charlemagne, fought without gunpowder, were almost interminable, whereas the wars with gunpowder have been of comparative short periods. The actual destruction of the soldier has been greater, but the quick decision has benefitted the people of the nations at war at large. We, the people, not engaged in war, have therefore everything to hope from modern discoveries, which will reduce the period of political wars from years to days. The phosphosulphided carbon, the Greek Fire of today, does not require to be ignited before it is thrown at an enemy, which was necessary with the fire of Callinicus. We have only to direct a shell full to the place desired—splash! The evaporation of the disulphide is rapid, leaving a thin coat of phosphorus —then all is flame. Mr. Septimus Piesse, F.C.S.,, to whom we are indebted for the chemical facts herein stated, suggests a pleasant thing in this way, which is a ball of gun-cotton soaked in sulphide of carbon.

Silicon: A New Compound, Sensitive to Light---Leukon.

The following interesting information is condensed from the *Photographic News* (London):—

"The photographic action of light upon all matter was some time ago a favorite subject of discussion and experiment. The researches of Herschel, Hunt, and others went far to prove that the chemical change which light was capable of inducing upon mineral and vegetable bodies was not confined to a few substances only, but extended generally to a vast number of substances in each class. The addition of a new member to a class of bodies is always of interest, but the discovery of a new and very sensitive photographic body is of especial value, more particularly, if entirely new ground is opened out by it, and the stranger comes before us as the representative of a new series of elementary bodies hitherto unsuspected of the slightest tendency to photographic change. If we had had to hazard a prediction as to the body whence the next photographically sensitive compound would be derived, certainly the last substance which would have suggested itself would have been common flint or silica. Until the last few years, silicium, the basis of this, was about the most uninteresting substance in chemistry; but now, through the researches of Wöhler, it bids fair to rival any of the other elements in the number and interest of its compounds. This chemist has recently discovered several new compounds of silicium which are of the highest importance. The starting point of them all is a curious, metallic-looking alloy of silicium and calcium, which is easily prepared by fusing together silicium, chloride of calcium, and sodium, with certain precautions. The silicide of calcium is then obtained in a button of a lead gray color and perfect metallic luster. In water this slowly disintegrates, forming a mass of lustrous scales like graphite, some impurities being extracted from it by this solvent. Strong nitric acid does not attack the silicide, and this acid affords the best means of obtaining it free from impurities. The most remarkable action of the silicide of calcium is its behaviour with hydro-chloric acid, by which it is changed into an orange-yellow substance, a brisk evolution of hydrogen taking place. This yellow body is called by the discoverer *silicon*, an inappropriate name, we may state *en passant*; as the metallic basis of silica, *silicium*, is often called silicon, and is generally known under that name in chemical books. Silicon is prepared in the following way:—The silicide of calcium, purified as above, is treated with concentrated hydrochloric acid in a vessel which must be placed in cold water to prevent the heating of the mixture. An evolution of hydrogen soon takes place, and the silicide is gradually transformed into silicon. The mixture must be often stirred to bring the powder entangled in the froth in contact with the acid, and then left for some hours in a dark place until the evolution of gas has ceased. It is then diluted with six or eight times its volume of water, the silicon filtered off, carefully protected from the light, well washed, then pressed between bibulous paper, and finally dried in a vacuum over sulphuric acid, the bell glass being covered with a black cloth. Silicon is of a bright orange-yellow color. It is composed of transparent yellow laminæ. It is insoluble in water, alcohol, and other solvents; when heated it becomes of a dark orange yellow. On applying a stronger heat it takes fire with a faint deflagration and some sparkling, leaving a residue of silicic acid.

"The behavior of silicon when exposed to the light is very remarkable. In the dark, even when moist, it remains quite unchanged. In diffused light it becomes paler; but in direct sunlight it, in a short time, becomes perfectly white, and hydrogen is given off. When placed under water in sunlight, hydrogen begins to be evolved immediately, and continues like a fermentation until the silicon has become quite white. The purer the substance the more quickly does the change take place, and several grammes are transformed in a few hours. If, however, it has not been perfectly protected from the light in the course of preparation, it is much longer before the whole is altered in sunlight. The formula of silicon is not accurately settled; but it contains silicium, hydrogen, and oxygen, and is supposed to resemble an organic body, in which silicium replaces the carbon. Professor Wöhler, indeed, suggests that it may, perhaps, be the type of an entire series of similar bodies, and it would then open the prospect of a special chemistry of silicium as of carbon.

"The behavior of silicon with metallic salts is curious. In the presence of an alkali, even of dilute ammonia, it is gradually changed into silicic acid, with evolution of hydrogen. When mixed with an alkali, whilst this decomposition is going forward, it acts as a powerful reducing agent on the salts of the heavy metals. Solutions of copper or silver salts soon become black, and gold solutions brown. From solutions of chloride of palladium and osmic acid, on the addition of an alkali, it immediately precipitates a black powder. A solution of lead in caustic soda is precipitated in the metallic state as a gray mass. The reducing agent in all these cases is evidently the hydrogen in a nascent condition. When silicon is thoroughly acted on by light, it is converted into a white body, to which the name Leukon has been given. The composition of this is also a matter of doubt, but it is a body of a somewhat similar composition to silicon, and in the presence of alkalies it behaves in the same way with some metallic salts. The mode of formation of leukon from silicon, under the influence of light, is also obscure; the most probable theory is that 4 atoms of water are decomposed, 4 of oxygen and 1 of hydrogen uniting to the silicon, and the other 3 of hydrogen being set free. According to this view, silicon is $Si_8 H_4 O_5$, and $Si_8 H_7 O_{10}$."

Sentence of Captain Stone of the "Africa."

An English journal says:—"Captain Stone is the first Commander of the Cunard Line who has been condemned by a Court of Inquiry, for a culpable want of caution in not having either slowed his engines or used the lead, when the steamer *Africa*, under his charge, had been driven to the meridian of Cape Race on the 12th of October last. Great sympathy has been expressed for Captain Stone, and the suspension of his certificate for six months must be felt as a severe blot on his professional reputation. Those who have voyaged with Captain Stone and know him as a skillful and urbane seaman, will sympathize with him in his misfortune, in common with his friends in Liverpool, and be pleased to see him on the quarterdeck again in his former capacity. At a meeting of Captain Stone's friends, Captain Judkins remarked that Captain Stone was not called upon to use the lead on the occasion in question. The accident to the *Africa* was not caused by the non-use of the lead, but by an unaccountable northerly under-current. Captain Judkins stated that if a whistle or any other signal had been placed on Cape Race the accident to the *Africa* would have been avoided, and many other sad disasters also prevented. He strongly blamed the British government for refusing an American invention of a steam-whistle which had been offered to them, and hoped that when the inventor came to this country with his signal that he would be better treated."

The sentence of Captain Stone is severe, it must be admitted; but the danger is great. So many accidents have happened at this point that the proprietors of the Cunard line owe it to their passengers and patrons to take decided action, so that disaster shall not occur in future.

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Improved Water Meter.

The object of the machine herewith illustrated is to measure accurately and automatically all kinds of hot and cold liquids. The action of the apparatus is regulated by the fluids themselves, and all parts continue to work so long as the tank is supplied. The several details are all designated by similar letters in both figures; the larger of the two showing the general arrangement and external appearance, with a portion of the casing broken out to disclose the interior, while the smaller is a section of the mercury chamber.

Fig. 1 shows a large metallic tank (A) of any form or dimensions desired; this is supported by four legs and has two chambers, B and C, at the bottom. These chambers are fitted with valves, the seats of which are at D (inside of course) and the valves themselves open downward. The top of the case carries the mercury chamber E, supported on a pivot and provided with elongated ends which reach over the valve stems F'; in connection with this chamber is the float G, jointed at its back end to the case. The train of wheelwork moves counters for registering the amount of liquid passed through the meter, and is contained in the frame H. The small counter balances on the right of the engraving are merely to aid in restoring the valves to their seats after the action of the liquid has caused them to open.

The operation of this apparatus is thus described by the inventor:

The fluid flowing into the case A will, on reaching a certain hight, raise the float G. To this ball the rod F is connected. This rod, in rising, will elevate the mercury chamber E. By doing so the mercury in the chamber *a* (see fig 2) will flow by its own gravity into the chamber *b*.

By the alteration of the position of the mercury chamber the valve in the bottom chamber, connected with the stem F', will be closed; thereby preventing more fluid flowing into the case A. The mercury chamber then assumes the position indicated by the dotted lines, and will depress the other valve, stem F; thereby causing the valve in the chamber C to open and allow the liquid to flow speedily out of the case A. The quicksilver in the chamber *b* (see fig. 2) will now commence to flow through the chamber *c* into the compartment *d* and through the channel *e* back into the chamber *a*; thereby causing the mercury, after a certain time, to return to its first position, and to close the valve in C and open the one in B.

By adjusting the small screw *f* the channel G will be increased or diminished in size, thereby fixing the time during which the valves remain open or closed; *g* and *j* are counter balance-weights for the purpose of keeping the valves shut during the time the apparatus does not press on the stems; *i* is a counter balance-weight for the rod I connected with the float, which increases its lifting power. There are screws, J, which can be taken out in order to remove any sediment or impurities deposited by the fluid in the chambers.

Fig. 1

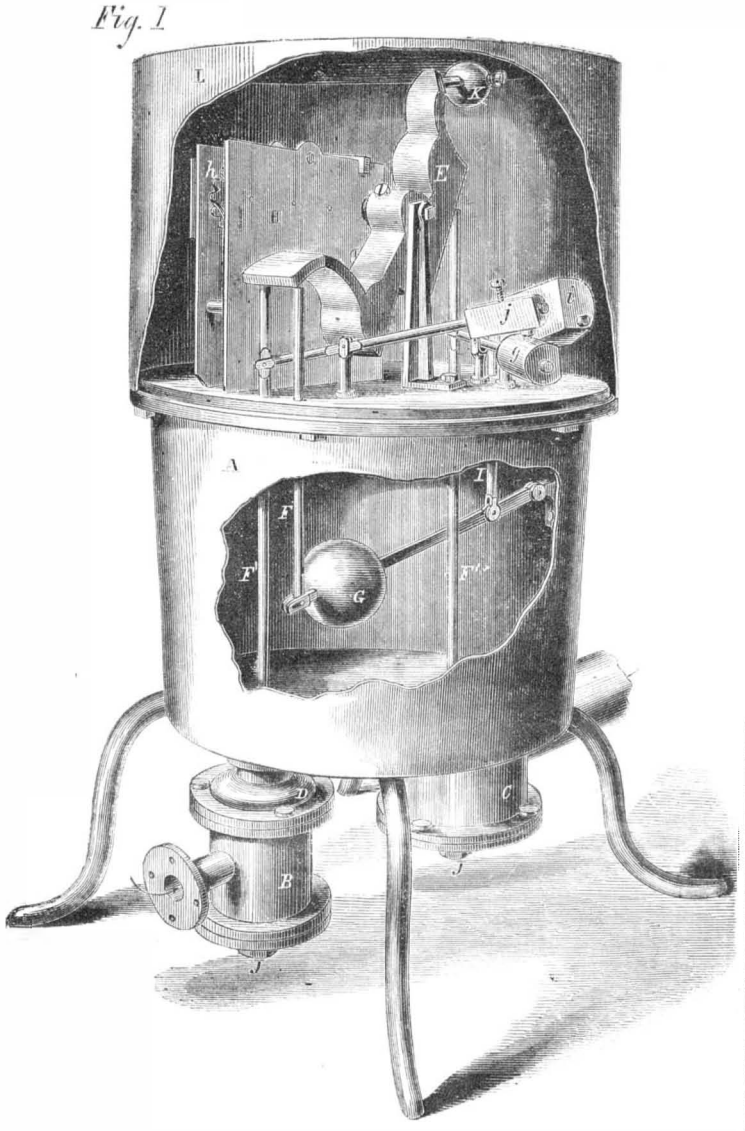
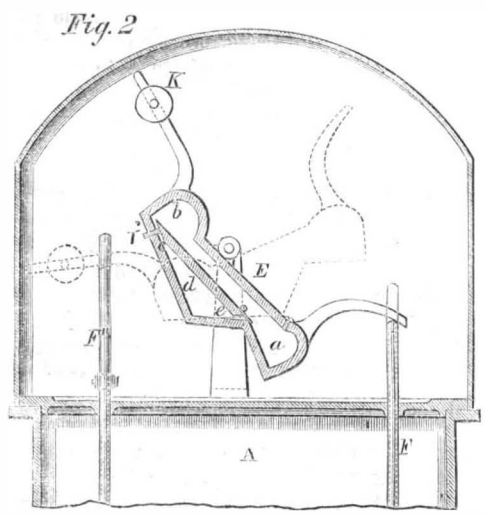


Fig. 2



The wheels *h* register the quantity of fluid passed through the meter in a simple manner, by counting the vibrations of the mercury chamber.

The weight, K, serves to aid in adjusting the mercury chamber. The locked cover, L, protects the working parts of the meter from derangement caused by any means whatever.

A patent on this water meter has been ordered to issue through the Scientific American Patent Agency to Henry Gerner, of this city. Further particulars can be had by addressing him at 20 Bleecker street.

GERNER'S WATER METER.

An Opportunity for an Experiment.

If foreign Governments desire information or the test of actual battle upon their iron-clads, they should send one over here and pit it against the forts in Charleston harbor. They have furnished the rebels with ships as a purely commercial venture, and they may now obtain further knowledge of the qualities desirable in an iron-clad vessel in the manner described. We have no doubt but that our Government would cheerfully afford our English friends every facility for attacking the most stubborn and formidable battery the rebels now hold; such a chance for practical information ought not to be lost by the Lords of the Admiralty. Send over the *Royal Oak* or the *Normandie*, and let the rebel rifles have a chance at their "impenetrable armored" sides; that will be a capital test of their invulnerability.

The Power of Belts.

It has been found that a belt 8 inches wide moving over the circumference of a smooth pulley at the rate of 100 feet per minute, communicates one horse-power. According to this datum, what is the power, say, of a 3-inch belt working over a 2-foot pulley, making 146 revolutions per minute. To obtain the velocity of the belt per minute, $146\times2\times3.14\ 16=917.3472$ feet: therefore $917{,}3472\times3\div800=3.44$ horse-power, or nearly 3¼ horse-power; and so on for all other breadths of belts. The divisor in this case is the horse-power 800. To ascertain the breadth of belt for a given horse-power, multiply the latter by 800 and divide by the velocity in feet per minute. This rule is sufficiently accurate for all common purposes. The rules are simple, and the unit of breadth pnd speed of belt per horse-power may thus be set down at 1-inch breadth of belt with 800 feet speed per minute. There are some hand-books for mechanics which contain formulas for calculating the power of belts and the breadth required to communicate a certain amount of power; but they are an imposition on common sense, because no explanation is given how the formula has been derived.

DAY'S KEROSENE LAMP.

The annoyance of cleaning and filling kerosene lamps is one of the greatest drawbacks attending their use, and we have often expatiated in the Scientific American upon this disagreeable task; certainly every one who uses them knows full well the truthfulness of our statement. The lamp herewith illustrated differs materially from others heretofore illustrated by us, in that it has no screw on the collar where it enters the lamp, such detail being unnecessary in its construction. In place thereof the tube, A, is formed with two spiral grooves, B, opposite each other, said grooves being received by short pins inside of the collar; these pins are stationary, and act as a nut; for when the burner and its attachments are pushed down, the same slowly rotate and fit tightly upon the seat. This affords a quick and easily-operated burner; the hole, C, is provided to fill the lamp without removing the burner or chimney. This attachment can be fitted to any old lamp as well as to new ones, by simply removing the ordinary screw collar and replacing it with this improvement.

This kerosene lamp burner was patented by C. T. Day, of Newark, N. J., on Oct. 20th, 1863, through the Scientific American Patent Agency. For further information address the inventor at Newark, N. J.

Value of Plows.—Among the Kaffirs agriculture is considered to be a kind of labor unworthy of a warrior, and is therefore entirely left to the women. When they first saw a plow at work they gazed at it in astonished and delighted silence. At last one of them gave utterance to his feelings: "See how the thing tears up the ground with its mouth! It is of more value than five wives!"

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VOL. IX, NO. 25 ...[NEW SERIES.]..... *Nineteenth Year.*

NEW YORK, SATURDAY, DECEMBER 19, 1863.

OUR NEW DRESS.

With the commencement of the new volume on the 1st of January next, we shall present the SCIENTIFIC AMERICAN, which has now attained its eighteenth year, in a new and handsome dress—one, we trust, that will become its age and character. Though we are growing old and somewhat *gray* in the service, we have still vigor and determination enough left to make us desire that our next volume should be by far the best yet issued. We shall continue to trim the midnight lamp, if necessary, in order that we may keep the standard of the SCIENTIFIC AMERICAN up to any former period in its history. We believe that no other journal ever published has had truer or better friends than ours; and we again appeal to them to aid us in promoting its more widespread circulation. We do not depend upon agents; we prefer to rely upon the good words and deeds of our friends, and upon the well-established character of our journal, to increase its circulation. Friends! lend us a little of your valuable time in increasing our subscription list, and we will endeavor to more than repay you by making it still more worthy of your confidence and support

CONDENSING AND HIGH-PRESSURE ENGINES.

The London *Mechanic's Magazine* advocates the adoption of high-pressure engines in place of condensing ones. It says:—"A very little additional expense will secure a thoroughly good boiler, capable of carrying high-pressure steam with much greater safety than a low-priced one, with steam of half the pressure. A moderately-sized cylinder, carefully clothed, and a piston running at a high velocity, driven by 75 pounds of steam, cut off at one-fifth of the stroke, and slightly superheated, will give out a greater useful effect per pound of coal than nine-tenths of the condensing engines in every-day use in our manufacturing districts, while the first cost for foundations, piping, engine, and general fittings, will be reduced nearly one-half! The non-condensing engine has been hitherto underrated and treated with a contempt which it does not deserve. Had it received one-half the labor devoted to the condensing engine, it would now hold a very high position as a safe and economical motive power. We would willingly draw the attention of engineers to this class of machinery, convinced as we are that they will find in its improvement a fair and remunerative field for the display of their talents."

These remarks of our cotemporary relate to a most important question in which engineers and all who use steam power are deeply interested. But they are of most interest to marine engineers and the owners of steamships, because condensing engines are used exclusively on sea-going steamers and first-class steamboats. Condensing engines are more complex, cumbrous, and expensive than those of the high-pressure type. Why, then, are they not employed on steamships, when with them there would be less weight to carry, more room secured for cargo or passengers, and their first cost would be much less. There must be some reason for the general employment of the most costly, in preference to cheaper engines on steamers. It is not because high-pressure engines are less perfect in their construction, or their nature less understood than others; for those which are built for locomotives have attained to as great perfection as the best low-pressure engines on steamships. The fact is, the opinion is very prevalent, and it is based on science, that the condensing engine is the most economical of fuel, and fuel is one of the greatest constant expenses connected with the use of steam machinery. It is generally believed that it will do the same amount of work with at least one-third less fuel, and if this is the case, of course the first expense, although greater for the condensing engine, is of secondary importance. It is also generally believed that condensing engines secure greater safety, because steam of lower pressure is carried in their boilers. But this is not a valid reason in their favor, because boilers can now be constructed to secure as great safety in carrying one hundred pounds pressure, as boilers were formerly built to carry twenty pounds. The chief argument in favor of condensing engines is their economy of fuel compared with the other class; because the condenser removes the back pressure of the atmosphere with a very moderate expense of power; and it is also well known that pretty high-pressure steam may be carried in their boilers and the principle of expansion be carried out to great perfection in using the steam. But the idea heretofore generally entertained respecting the economy derived from working steam expansively is now denied to be correct. Chief Engineer Isherwood, U. S. N., in his testimony given lately in Washington, respecting the use of cut-off-gear for working steam expansively, is reported to have stated that there was only about 18 per cent difference between the best cut-off and no steam cut-off at all; and that this was the whole practical difference between using steam expansively and non-expansively. But Mr. Reeder, of Baltimore, a practical engine-builder, in his evidence asserted the contrary doctrine—namely, that economy was just in proportion to the extent of expansion. Here, then, after the steam engine has been applied to navigation for about sixty years, and after having attained to such great perfection in the construction of engines, we find engineers of high standing in their profession differing in opinion upon the very elementary principles of steam engineering. If there is no economy in condensers and in working steam expansively, then condensing and expansive-working steam engines are great absurdities, and their place should be supplied with simple, cheap, high-pressure engines without cut-offs or condensers. These disputed questions are certainly not difficult of solution, and it is the duty of professional engineers to solve them. Theory based on science accords great economy to the working of steam expansively, and if this is not secured in practice it is reasonable to suppose that there must be some imperfection in the practice.

USE PATENTED ARTICLES.

The efforts made by inventors to improve the character and efficiency of the several articles in daily use are worthy of remark and encouragement by the community in general. Nearly every department of practical life, whether in the store, household, office, or wareroom, bears evidence of the efforts of the class alluded to to lighten labor. The proof of this assertion may be found in the almost endless category of useful patented articles, which are, or should be, employed so universally. Of these we may mention cork-screws, boot-jacks, fire-shovels, lock-catches, stereoscopes, carriage-jacks, spring-heeled boots, skates, stamp cancelers, fountain pens and inkstands, copying presses, hay presses, and a host of others, to enumerate which would require the talent of an auctioneer. Let any business man note the facilities afforded by the new stamp cancelers, copying-presses, erasers, &c., and compare them with the old-fashioned cumbrous instruments for the purpose, and then ask himself if he would be willing to go back to the state of things which existed twenty years ago. Let every housekeeper ask herself also, whether she would be willing to dispense with clothes-wringers, washing-machines, &c., and twist her hands sore and her heart sick in the vain effort to do what a pair of rollers or a set of rubbers do in the tub, for both washing and cleansing the soiled linen of the family. The same self-examination may be held by every individual in the community with regard to almost everything in use.

The patent mark on an article is in some respects like the mint mark on a coin; it stamps it as valuable. There should be a more general inclination among the people to use patented articles. Inquire of your house-furnisher, lady readers, for the newest and best addition to the culinary or general housekeeping department, and you will doubtless be agreeably surprised by receiving something that is new to you, and which will materially lighten your cares.

Let every man also look about him and obtain the best instruments, tools, or what not, for carrying on his business, and he will have every advantage that it is possible to obtain. It is only by keeping up, or in fact a little ahead of the times, that one can hope to succeed; in these days when competition is so active, no means should be left unadopted to secure a prosperous business.

SELF-STOPPING GEAR FOR TOOLS.

It has lately become the practice for a certain class of machinists to affix self-acting gear to lathes and similar tools, so that when the carriage reaches a specified point, either the feed is thrown out and the carriage stops, or else both feed and lathe are stopped and the work thus saved from injury. This is a good plan and one that might be generally adopted with economy on every machine. Such an attachment would be cheap, and might save ten times its cost at times when either accident or carelessness had jeopardized the tools. It amounts to an insurance from damage upon the tool so fitted; and certainly any manufacturer who has paid for broken gears and brackets, or stripped nuts in the feeding apparatus, will acknowledge that anything which promises immunity from such disablement is worth attending to. It may be said that if a man pays attention to his business he is in no danger of breaking tools; but that is not a good argument against the adoption of preventives against loss; for accidents will happen in the best regulated shops, and after the wreck of machinery lays on the floor it is hard to look at it and say "This might have been guarded against by a little forethought and the outlay of a few dollars." Such attachments as we have advocated cost but little primarily, but may save large sums in repairs and rebuilding tools. In addition to these improvements much advancement has been made in adapting lathes and other machines to do work that has until recently been accomplished only by the use of several cutters shaped for a special purpose. As, for instance, the curves in the necks of connecting-rods, valve stems, &c.; also the octagons, or hexagons, which are sometimes formed upon the same parts of an engine. In some shops in this country these are done wholly by the lathe itself, automatically, it may be said, since the turner has nothing to do but to keep his tools sharp and the work running and the ends shape themselves, "rough-hew them" how the previous operator will.

These additions are also a safeguard against idleness on the part of shiftless men, for the lathe stops when the feed has reached a certain point; and if the turner be off gossiping or otherwise neglecting his duty, the result is shown by the action of the self-stopping arrangement and subsequent inaction of the tool. In many ways these simple attachments commend themselves, and employers, enterprising mechanics, and others, should see that their tools are so fitted without delay.

ECONOMY OF FUEL---SMELTING IRON.

A correspondent of the *United States Record and Mining Register* communicates a long article on the waste of coal used for smelting iron, and ridicules the construction of the common smelting furnaces; asserting that they are worthy of the days of Tubal Cain, who lived five thousand years ago. He states that two-and-a-half tuns of coal are employed to reduce one tun of iron from the ore, while one tun ought to be sufficient if properly managed. He confesses to a want of precise information respecting the art of smelting iron ore, but suggests that a saving of fuel might be effected with the use of the blow-pipe.

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Iron manufacturers, we believe, would gladly adopt any practical method of smelting ore by which a saving of fuel could be effected; but every smelting furnace has now its blow-pipe in its hot or cold blast—which ever is used—and this cannot be much improved without substituting a blast of oxygen gas for that of common air. As common air contains four parts of nitrogen to one of oxygen, and as the former is perfectly inert and of no use to promote combustion, all the fuel taken up to heat four-fifths of the blast is therefore wasted. By using oxygen gas for the blast, a more intense heat would be secured in the furnace with far less fuel. Great attention has been directed to the manufacture of oxygen gas at a low cost, for the purpose of using it in smelting metals upon a large scale; but thus far without success. There is also another difficulty in the way of using oxygen for smelting in common furnaces. These are lined with fire brick which is capable of withstanding the temperature produced by the common blast; but with the use of oxygen the heat generated would be so intense that they would be liable to fuse as well as the ore. With a dry atmosphere and the use of graphine as fuel in a cupola urnace, we have known of the fire brick fusing like lass during the melting of pig iron. Probably some more fractious material, however, could be obtained to obviate this difficulty.

The heat of the waste gases of iron-smelting furnaces is employed in many large establishments for generating steam in the boilers of the engines that are used to drive the necessary machinery. For this purpose the gases are conveyed in pipes under and around the boilers, and thus the waste heat is economised. In iron smelting furnaces the heated gases must pass off at a very high temperature; this is inevitable in maintaining the high heat required to reduce the ore, and it is only by such modes as those described for applying such waste heat that it can be economised, to the saving of fuel. It should not be forgotten also that lean ores require more fuel in smelting than rich ores, because a greater quantity of ore has to be acted upon to obtain the same amount of pig metal. We have no doubt that iron manufacturers would readily adopt any new practical method for smelting that would save one tun or half a tun of coal to the tun of iron, for the cost of coal is the greatest expense incurred in many places in reducing iron ores. In the iron region of Lake Superior, for example, where the ores are so abundant and rich, there is no coal, and that which is used has all to be carried from a great distance. If one tun of coal could be rendered sufficient to reduce one tun of Lake Superior iron from the ore, pig metal could be produced with profit for $16 or $17 per tun. This is an important subject, especially at the present time when coal is so high in price and iron is in such great demand.

LUBRICATING CRANK PINS.

In a foreign exchange we find an account of a method used to lubricate the crank pin of a small engine, such as is used for driving the blowers on board of our steamboats, said engine running at the rate of 300 revolutions per minute. The crank pin was bored out internally, nearly through from end to end, and two holes were drilled from the surface of the pin into this hollow center. A tallow candle was put into the central orifice and the same closed by a screw plug. When the pin became heated by friction the tallow fused and ran out through the small holes. In this way the pin was always well lubricated; one candle lasted a whole working day.

The plan adopted on our gunboats, where the engines run at speeds of from 85 to 100 revolutions per minute, is to have a stationary oil cup fitted to a stationary bracket, said bracket being directly over the cranks when they are vertical; this oil cup is furnished with a ball-and-socket joint at the bottom, from whence a pipe proceeds which is a little longer than the stroke of the cranks; into this pipe a second one is slipped (like a telesoope) which communicates with a ball-and-socket joint on the strap of the connecting rod on the crank pin end. From this arrangement it is easy to see that when the upper stationary cup is filled with oil, the fluid will run down the pipes on to the pin, without incurring loss or imperfect lubrication. The ball-and-socket joint allows the pipes to work back and forth quite easily. Nearly all the navy vessels are thus fitted.

WATER WHEELS IN THE KITCHEN.

Quite a novel, and it would appear a profitable application of water power has been recently made in England, and our inventors, proverbially enterprising and wide-awake, have in this case been a little distanced by their transatlantic brethren. Schiele, a skillful and well-known manufacturer, celebrated also as the discoverer of the anti-friction curve, so extensively used in machinery both here and abroad, has designed a small turbine wheel which has been applied to domestic use in many cases with great success. Attention has been given to the subject in this country also, but on a limited scale. There is no good reason, however, why it should not be more fully developed. In small families, it is true, there is not much work for a water-wheel, soberly speaking; but in large ones there is a great deal of mere "pulling and hauling" which might be done by machinery instead of hand labor, such as driving the wringing-machines, mangles, chopping meats, sifting ashes, drawing wood, &c., and although we must not suppose that every house will be fitted up like a factory, it is not unreasonable to expect that in future large establishments and those of moderate size will have a due proportion of labor-saving machinery. For hotels and stores small water motors would be a great improvement on steam, which is too often under the charge of incompetent and reckless persons; and for printing offices in towns where water can be laid on with a sufficient head, the class of motor advocated would be both useful and economical. The New Haven *Register*, we are told, is now printed by the agency of such a machine. In fact, the uses to which a small and convenient water wheel or hydraulic motor of any shape can be put, are infinite, and readily suggest themselves to all The motive power should be so made that it could be taken off and put on the water pipes as easily as a gas meter is attached to its place, and the shaft should have a universal joint upon it, so that it could be diverged from a straight line if necessary and adapted to suit circumstances.

During the past eighteen years there have been quantities of water wheels illustrated in the Scientific American, and we do not see why the enterprising inventors of them should not take hold of the subject here suggested and work it out to a practical issue.

WHY ARE THE MONITORS IDLE?

In common with a great portion of the community we should like to know why the monitors are idle; for that they are, virtually, everyone must admit. Bombarding the ruins of an old fort without any guns in it is not exactly what they were designed for, and does not seem to require a great deal of strategy or the most superhuman naval talent. We have the fullest confidence in the vessels themselves, and believe them to be capable of going anywhere within the range of the rebel guns; we should like to know why their offensive powers are not brought into use. General Gillmore has done all and more than was required of him, and is now daily throwing Parrott shells into Charleston; what are the monitors doing? Giving a moral support to General Gillmore, we suppose, for they are certainly idle in every sense of the word. The fearful beer-barrel and clothes-line harbor obstructions which were to sink every vessel that came near them have been brought to light; they have been torn up by the violence of the sea; the way is therefore clear to advance, and we should like to be told why no effort is made to get a few inches at least nearer to Charleston.

THE MACHINISTS STRIKE.

The difficulties between the strikers and their employers still remain unadjusted. The men refrain from work and the manufacturers are equally firm in maintaining their position. It is therefore only a question of time when the machinists trade will be resumed in this city. Large numbers of men have left to obtain work in other towns. The strike is not general throughout the trade, as a great many of the workmen would gladly go to work if they were not deterred by threats and the fear of violence from their fellows. We are told that parties of machinists go to shops where certain men are employed under contract, and who have had the courage and honesty to continue on in their duty despite threats, and endeavor to deter them from pursuing their occupation; also that apprentice boys have been warned to discontinue their work, or they would be made an example of. This is entirely wrong and should not be permitted by the better class of machinists. Such a course will soon deprive them of their real friends. If any man wishes to go to work, *he must be allowed to go;* he should not be bullied or abused in any way. This is still a free country, and if reason or argument cannot convince a workman that he is doing wrong to work when his comrades are idle, then there is no help for the others but to submit. Mob law and terrorism won't do, and we hope our friends will heed our words and not disgrace a trade which has always borne a good name, by any overt acts. It would be far better for all hands to go to work than to lose more time in trying to obtain what, it is very evident from the attitude of the proprietors, will never be granted.

NITROUS OXIDE AS AN ANESTHETIC.

A few weeks since we published a letter from Prof. Dussauce, against the use of nitrous oxide or laughing gas as an anesthetic agent, in which he quoted the opinions of several distinguished chemists, as to its injurious effects upon the human system. Two communications have since appeared in our columns against the views expressed in that communication, and in these the safety of this anesthetic agent was advocated. A short reply by Prof. Dussauce will be found in another column. He simply states that he has no intention to engage in a discussion upon the subject, but reiterates his former opinions as coinciding with those of the authors to whom he referred. The *Cosmos* for this month contains an article upon this subject by George J. Ziegler, M.D., in which he describes the characteristics of nitrous oxide, and wherein it differs from ether and chloroform in its effects upon the human system. He states that other anesthetics are directly sedative in their action upon the animal organism; whereas it is primarily and permanently stimulative, not being followed with any of that languor so peculiar to the others. There is a relation between its action and that of atmospheric air, as it contains a greater proportion of oxygen. At the same time, he states that as an anesthetic it is not altogether devoid of danger. It produces a sort of delirium of a pleasurable and sensitive character; but he says, "It cannot nevertheless be indiscriminately employed with safety; for the artificial excitement of the system which is rapidly engendered by its free administration, may not only prove injurious by directly increasing the tendency to irritation, hemorrhage and inflammation, in the parts subjected to surgical mutilation, but may also develope latent pathological tendencies of a different as well as of a like character in other parts of the body, in persons with certain abnormal predispositions; to such a degree, indeed, as to seriously injure health, if not absolutely endanger life itself."

He states that the character and particular manifestation of such tendencies depends upon the special predisposition of the individual system acted upon, as the nitrous oxide has "a marked preference for the blood, brain, nervous system and genito-urinary organs." Undue excitement occasioned by the free or inappropriate use of the protoxide of nitrogen may produce primary and secondary irritation, congestion, serous or hemorrhagic effusion and inflammation in different parts of the body, and especially in the brain and kidneys. In other cases, however, it may produce beneficial effects by aerating the blood and stimulating the action of the system. It has undoubtedly sanative properties, but Dr. Ziegler states that while he does not undervalue this remarkable agent and has no disposition to excite undue apprehension respecting its potent action upon the human system, his precautionary remarks respecting its nature and indiscriminate use are put forth for the purpose of enabling it to be so applied as to avoid evil and obtain good. Hence he says, "Nitrous oxide should always be administered with great care and precaution."

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LECTURE ON THE IRON-CLADS.

Mr. B. S. Osbon gave a lecture on this subject at Niblo's on the 2d instant. The lecturer had been many times under fire in the vessels, and gave portions of his experience in and opinions of the monitors, in a manner which was well received by the large audience assembled. He was also aided in his delivery by several diagrams and models of the vessels, and proceeded to set forth the peculiarities of the iron-clads at sea and in action. The remarks he made were simply matters of fact, well known to the readers of the SCIENTIFIC AMERICAN, and we do not deem it necessary to reproduce them here. In relation to the speed of the monitor batteries, Mr. Osbon stated that the *Montauk* (to which vessel he had been attached) had achieved 8¾ knots per hour with ease. In regard to the effect of shot striking the turret, he said that those inside were not incommoded in the least by the concussion, and that he would not object to remain within 18 inches of the turret when hit by heavy shot. The large guns, when fired, were also unobjectionable in respect of noise to the crew inside; some difficulty, however, was experienced when the 15-inch guns were fired; as all the powder was not burnt, some of it would be blown in the face of those in the pilot house when heavy winds prevailed.

The lecturer compared our iron clads with those of the other naval powers—France and England—and thought, as does every practical person conversant with the subject, that there is great room for improvement in the foreign armored vessels, and that in a contest with anything like equal numbers we must prove the victors.

To judge from the usual manifestations the audience were pleased with their entertainment.

Incrustation of Boilers.

We have frequently referred to this subject and the different remedies for it. One of the most reliable is the "Anti-incrustation Powder" of Mr. H. N. Winans of this city, to which we drew especial attention in our issue of June 21, 1862. Since then we have seen a number of additional testimonials of its operation, and from all we can learn, it is perfectly reliable. Messrs. Bement & Dougherty, Philadelphia, after two years successful use, pronounce it uninjurious, and George Shield, Chief Engineer of Cincinnati Water Works, after five years use, says it not only has no injurious effects, but prevents the iron from oxidizing. These valuable recommendations, with many others, induce us to give it our approval and to recommend it to all using steam. With the high price of fuel and the immense loss in generating steam, occasioned by the formation of scale in boilers and the consequent injury to the iron by overheating, we consider almost any expenditure an economy which will effect a remedy, and this we believe Mr. Winans's material will do without injury to the boiler. We therefore advise our readers to consult his advertisement, make a trial and save fuel, repairs, &c.

Invention the Road to Riches.

What would the world be without the thousand-and-one ingenious little utensils, tools, instruments, and appliances scattered on every hand? It would compare with a workshop without tools, a hand without fingers, a wagon without wheels; it would, in short, be as helpless as a rudderless ship without sails. In the field of invention there are many avenues and bye-paths as yet unexplored and unworked. Men dig in the bowels of the earth for gold and for diamonds, but there are mines of wealth lying upon the surface: it only requires a keen vision, practical ideas, and a little study to discover them. Men *do* find them every day. Let those who seek a speedy road to riches turn their attention to the useful arts and to supplying the wants existing in them for improved machinery. In this way they will not only do themselves a service, but the world also.

PETROLEUM.—A freshet occurred on Oil Creek on the 22d ult., when about 200 boats laden with petroleum started down, carrying about 20,000 barrels. In a few places the boats were jammed owing to the hurry and confusion to get out of the creek, and the loss incurred has been estimated at about $20,000.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list:—

Potato Digger.—This invention consists in the arrangement of a hinged adjustable platform supported by a castor wheel in combination with a frame supported at the front end by two wheels and carrying a rotary digging cylinder, a conveyer and a slotted endless apron, in such a manner that, by said hinged platform, the digging cylinder can be thrown in and cut off the ground, and the potatoes, by said cylinder are thrown on the conveyer and delivered to the slotted apron and by said apron carried up over the hinged platform and dumped, free from dirt and other impurities, into a basket or other receptacle, on the rear of the hinged platform. Albion Wheeler, Mallory, Iowa, is the inventor of this potato digger.

Vulcanizing Burner.—The principal object of this invention is to provide for the heating of dentists' vulcanizing apparatus and the regulation of the heat thereof, in such manner as to effect perfect vulcanization in the shortest time practicable without the constant attention of the dentist, which, with the means of heating heretofore in use, has been necessary to insure perfect work. In performing the vulcanizing process the work may be heated rapidly to a temperature of about 280° Fah., beyond this point the increase of temperature to the vulcanizing point must be regular and not exceed 1° a minute. It is also desirable to have the temperature remain near that point for some minutes, but detrimental to have it greatly exceed that point. This invention consists in a novel system and construction of burners, and in an extinguishing apparatus connected therewith, whereby the work is enabled to be heated rapidly to as high a point as it is safe to do so, and then to heat more slowly to the vulcanizing point, and whereby the flame is extinguished when vulcanization has been completed. G. E. Hayes, of Buffalo, N. Y., is the inventor of this improvement.

Fruit Press.—This invention relates to a new and improved press which is more especially designed for expressing juice from grapes and other fruit, for the manufacture of wines, &c. The object of the invention is to obtain a simple, portable and ecenomical press for the purpose specified, and one that may be operated with facility, and perform its work expeditiously and thoroughly. To this end the invention consists in a novel arrangement and application of a windlass for operating the follower of the press, and a novel arrangement of parts for holding the windlass, and consequently the follower at any desired point. The invention further consists in a novel construction of the curb in which the fruit is pressed, and also in the employment of perforated boards placed within the curb and arranged so as to admit of a free escape of the juice from the fruit under pressure. John Manrow, of Sacramento, Cal., is the inventor of this improvement.

INTERESTING TO MINERS.—We have received a letter from Mr. Alexander Rabe, editor of the *Hamburger Gewerbeblatt*, in which he states that, by some effort, he would be able to induce from 4,000 to 5,000 experienced miners of Saxony, Hanover, &c., to emigrate to the United States, if such guarantees would be given to them as to make it sure that they could find employment immediately on arriving here. We publish this fact in order to enable proprietors of coal mines in this country to avail themselves of the opportunity, and to make an effort to obtain a supply of experienced hands, which they appear to be greatly in need of at the present time. Any letters relating to this matter addressed to Mr. Rabe, we think will be promptly attended to by that gentleman. We are not personally acquainted with the gentleman, but he refers to the American Consul at that port.

CARS FOR NARROW AND BROAD GAGE RAILROADS.—A car built upon a plan patented by Mr. C. D. Tisdale, of Boston, adapted to run upon the narrow gage roads of New England and the Grand Trunk Road of Canada—broad gage—has lately made a trial trip of 500 miles, loaded with 100 barrels of flour, and passed alternately over the narrow and broad gages with perfect success.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING DECEMBER 1, 1863.

Reported Officially for the Scientific American.

***** Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.**

40,729.—Journal Boxes for Railroad Cars.—W. B. Aitken, Philadelphia, Pa.:

I claim, first, Combining and arranging the reversible bearing, D D, or their equivalents with the support block, E, and box, A, with the converging support ribs, e e, substantially as described and for the purposes set forth.

Second, The combination and arrangement of the packing ring, F, chamber, G, spring ring, H, and adjusting screws, I I, with the shaft, B, the whole being constructed and arranged to operate substantially as and for the purposes set forth.

Third, Arranging the lubricating collar, J, on the outer edge of the journal, C, by means of the spring ring, K, or its equivalent, substantially as described and for the purpose set forth.

40,730.—Chimney.—R. M. Basset, Birmingham, Conn., and George Mallory, Watertown, Conn.:

We claim forming a chimney of cast-iron substantially as described.

We also claim making the cap, c, separate from the chimney body and the two in such manner that different designs of cap may be employed on the same pattern of body or case as hereinbefore specified.

40,731.—Slide Valve for Steam Engines.—R. C. Bristol, Chicago, Ill.:

I claim, first, The combination of the parallel overhanging ways formed in the ends of the valve with the parallel ways of the seat composed of separate metal, and the friction rollers, the said ways being in a plane corresponding with the face of the valve, substantially as and for the purposes set forth.

Second, The valve with its face grooved as described, in combination with the straight or parallel ways, having rollers between them for the purpose of making the valve self-fitting and relieving such rollers in part from the load.

Third, Constructing the valve with a grooved face, and arranging the same with respect to friction rollers, in such manner that it is free from the rollers during the self-fitting of the valve to its seat, and afterwards is mainly supported upon the rollers and operates to always be thus supported, substantially as herein described.

Fourth, The combination of horizontal or parallel ways, friction rollers and grooved valve, substantially in the manner and for the purpose set forth.

40,732.—Manufacture of Steel.—W. H. Brunt and J. W. McElroy, Pittsburgh, Pa.:

We claim in the process of making steel direct from pig iron in an ordinary puddling furnace, throwing into the furnace pulverized charcoal or other carbon, when the iron begins to granulate, and closing up the furnace to retain the gases evolved therein, as herein described.

40,733.—Plow.—A. B. Chapman, Pittsfield, Mass.:

I claim, first, The roller, G, constructed as shown and described with concave sides, and mounted upon a vertical or nearly vertical shaft at the rear of the mold-board, E, in the manner and for the purposes specified.

Second, The lever, J, employed in connection with a screw shaft, H, and nut, K, or equivalent devices to adjust the roller, G, and secure it in any position.

Third, The combination with the roller, G, and lever, J, of the bracket, I, constructed as described, and employed for the attachment and securing of the said lever and the handle, A′, as explained.

[This is an ingenious and effective contrivance, whereby the mold-board of the plow is relieved of the greater part of the furrow slide and the power required to draw the plow correspondingly reduced.]

40,734.—Lamp Lighter.—C. M. Clinton, Ithaca, N. Y.:

I claim the combination of the tube, B, the stopper, C, and the wire wound wick, when one or more wires are used about the wick, for the purpose of preventing the destruction of the wick in the smaller part of the tube, and to draw the wick out of the tube, for trimming it, as well as to center and protect the flame about the projecting wire or wires.

40,735.—Machine for Finishing Leather.—S. P. Cobb, South Danvers, Mass.:

I claim the peculiar mechanism for obtaining the compound movement of the dicing staff, D, the same consisting of the fly wheel, E, the connecting rod, F, the rocker lever, C, and pitman, c, arranged and so as to operate substantially as hereinbefore specified.

I also claim the combination and arrangement of the brush, H, or leather-cleaning mechanism with the dicer, a, and its staff, D.

I also claim the combination and arrangement of the adjustable smoothing tool, I, with the dicer, a, and its staff.

I also claim the combination and arrangement of the scraper, o, or cleaning mechanism with the dicer, a, and its curved bed, G.

40,736.—Shuttle for Sewing Machines.—Joseph Coignard, Nantes, France:

I claim the combination of a polished tension roller or cylinder held within the cavity of the shuttle, as described, with polished metallic eyelets lining the holes of the shuttle through which the thread passes, substantially as herein set forth.

40,737.—Producing Oil and Spirits of Turpentine from Pine Wood.—S. L. Cole, Burlington, Vt.:

I claim the discovery or invention of producing oil or spirits of turpentine and other analogous oils directly from wood, using for that purpose the apparatus hereinbefore described or any other substantially the same, and which will produce the intended effect.

40,738.—Band Ruffle.—C. O. Crosby, New Haven, Conn.:

I claim as a new article of manufacture the within-described band ruffle produced from a strip of fabric shined, crimped or plaited, and combined with a band also, made from a single strip of fabric, and the band and ruffle folded and stitched with two rows of stitching, in the manner substantially as herein specified.

40,739.—Band Ruffle.—C. O. Crosby, New Haven, Conn.:

I claim as a new article of manufacture the within-described band ruffle, produced from a single strip of fabric folded and plaited, crimped or singed and stitched through the band and ruffle with two rows of stitching, substantially in the manner herein set forth.

40,740.—Automatic Dancer.—T. N. Crow and J. N. Crow, Mott Haven, N. Y.:

I claim, first, The employment or use of the spring-board, A, or its equivalent, in combination with the figure, B, having jointed limbs, and otherwise constructed and operating in the manner and for the purpose substantially as specified.

Second, The combination of the elastic rod, C, with the figure, B, and spring-board, A, substantially as and for the purpose described.

[This invention consists in combining with a spring-board or other device to which a vibrating motion can be imparted a human figure with jointed limbs, in such a manner that by imparting to said spring-board a vibrating motion, and holding the feet of said figure in close

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proximity to the surface of the board, the figure begins to dance in the most ludicrous and comical manner.]

40,741.—Rotary Harrow.—Charles Daniel.—Sigel, Mo.:

I claim, first, A rotary harrow with a star-shaped frame, A, constructed and operating in the manner and for the purpose substantially as described.

Second, The central guide ring, B, in combination with the star-shaped frame, A, and with the grooved rollers, b, attached to the draught pole, C, substantially as and for the purpose set forth.

Third, The prongs, E, secured to the corners of the star-shaped frame, A, and operating in combination with the teeth, D, and draught pole, C, substantially as and for the purpose specified.

[The distinguishing features of this improved harrow consist first, in the shape of the frame; second, in the means employed for the purpose of connecting the draught pole to the frame, and third, in the application of gages or shovels on the outer ends or corners of the frame and set deeper than the teeth and crooked in such a manner that the same take deeper hold on one side than on the other, and cause the harrow to rotate as the same is drawn forward.]

40,742.—Air-tight Cork.—J. S. Davison, Cranberry, N. J.:

I claim the application of a layer of gutta percha (or other substance which will prevent the admission of air) to stoppers of cork, so as to render them impervious to the air in the different ways herein described, or by other means, substantially the same, the whole being arranged substantially as and for the purposes set forth.

40,743.—Fire-box of Locomotives.—Cyrus Dean, St. Catherines, Canada West:

I claim, first, Making the fire-pan, B, solid or pan-like, without grate bars or openings, for the purposes and substantially as described.

Second, I claim arranging the draught flues and dampers, E, so that the air will pass over the fire pan, and feed the fire from the four sides and at a convenient distance above the bottom of the fire pan, substantially as described.

Third, I also claim the combination of the angle-plates, C, with the solid fire pan, B, substantially as set forth.

40,744.—Signal Code for Rockets.—G. H. Felt, New York City:

I claim, first, The combination in columns of spaces, representing words, letters, figures or combinations of the same, any one of which can be designated by the corresponding numbers of the column and layer, the intersection of which will be the space required, substantially as and for the purposes herein specified.

Second, Arranging these columns on leaves, which leaves are made to slide in and out of frames, whereby the relative position of the spaces are changed, substantially as and for the purposes specified.

Third, Arranging these columns on both sides of the frames and movable leaves, substantially as and for the purposes herein specified.

Fourth, Designating the colors or number by characters, instead of numerals, substantially as and for the purposes herein specified.

40,745.—Means of Attaching Skates.—John Forbes, Halifax, Nova Scotia:

I claim the foot-plate, C, pivoted to the runner, A, or connected to it by a hinge, and provided with a fastening formed of a projection, p, at the back of the runner, and a catch, K, on the foot-plate or other suitable arrangement, and also provided with a sliding plate, F, which is connected with the runner, A, by means of a link, J, in combination with the clamps, II E E b b, all arranged to operate substantially as and for the purpose herein set forth.

I further claim the manner of applying or arranging the clamps, b b H, so that the same may be adjusted to suit boots or shoes of different sizes, to wit: by having the plate, G, in which the oblique slots, h h, are made attached to the sliding plate, F, by screws, g g, which pass through oblong slots, i i, into the plate, F, and having the clamp H, attached to the plate, F, by screws, j j, which pass through oblong slots, k k, in the plate, F, as herein described.

[This invention relates to an improvement in that class of skate fastenings, or means of securing skates to the feet, in which jaws or clamps are employed to grasp the heel and sole of the boot or shoe. The object of the invention is to obtain a fastening of the kind specified which will admit of the skate being applied to and detached from the boot or shoe with far greater facility than hitherto, and at the same time form a firm and secure attachment.]

40,746.—Fly-expelling Fan.—W. R. Fowler, Anne Arundel County, Md.:

I claim the sleeve, M, rods, I I, thumb-screws, n n, and revolving shaft, G, when the whole shall be constructed, arranged and operated as and for the purpose herein described.

40,747.—Die for Cutting Stencil Plates.—D. G. Garretson, New York City:

I claim as an improved article of manufacture a die for cutting stencil plates formed by sinking a groove of semicircular or an approximate form within the outline of the letter or figure of the die and having the outer surfaces of the outline vertical or nearly so, substantially as herein set forth.

[This invention consists in an improvement in cutting the dies, as hereinbefore described, whereby the same are rendered more durable than usual, and made to cut with greater facility.]

40,748.—Machine for making Railroad Chairs.—B. F. Gossin, Cincinnati, Ohio:

I claim, first, Bending the lips of wrought-iron railroad chairs by means of a pair of rolls rotating on axes perpendicular to the base plate of the chair and acting simultaneously on the outsides of the two lips, in combination with a suitable mandrel for forming the interior of the chair, all substantially as hereinbefore described.

Second, The combination of the washers, g, and slots, K, arranged and employed as described for the purpose of adjusting the machine to different widths and thicknesses of chairs.

Third, The arrangement of a pair of rolls, B B′, rotating horizontally and in the plane of the chair plate, in combination with the rabbeted table, J, and mandrel, L, all constructed and operating, substantially as set forth.

Fourth, The combination of the rabbeted table, J, for retaining the finished chair while the mandrel is being expelled, with the finger, h, depending from the rack, H, for expelling the mandrel by the return motion of the said rack, as explained.

40,749.—Direct-acting Engines.—Thomas Hanson, New York City:

I claim the employment of two piston valves attached to a tubular valve stem, substantially as described, in combination with the rod sliding in the said valve stems and operated at first by a tappet arm on the piston rod, and then by pressure on its cam, and communicating motion to the valve rods by a lost motion, substantially as described.

I claim also combining the piston valves of the pump with the piston valves of the engine by a rod passing through and working in the tubular stems of the said valves to operate them, in combination with the mode of operating the said rod partly by a tappet on the piston rod, and partly by pressure on the double inclined cam attached to the said rod, substantially as and for the purpose described.

40,750.—Dentist's Lamp for Vulcanizing.—G. E. Hayes, Buffalo, N. Y.:

I claim, first, The combination in a spirit-lamp for vulcanizing or other purposes, of two burners, one of which is supplied by a chamber, d, containing a measured quantity of spirit and [illegible] connected with a reservoir by means of an automatic [illegible], substantially as herein specified.

Second, The cut-off consisting of a lever, H, [illegible] the flexible supply pipe, c, and a wire, S, or its equivalent, having its ends united with fusible solder applied in combination with the [illegible] box, E, or other apparatus, to operate substantially as herein specified.

40,751.—Churn Power.—[illegible] Mong, Rensselaerville, [illegible].

I claim the escape wheel, H, pawls, f f′, arms, d d′, with weight, m, attached at rock shaft, L, in connection with the rod, N, and bent lever, O, or their equivalents, all arranged and combined with the bearing and weight or a spring, to operate substantially as and for the purpose herein set forth.

[This invention relates to a new and improved churn power of that class in which a weight or spring is used as a motor. The object of the invention is to obtain a much simpler device than those previously devised for the purpose, and one which may be economically constructed and be compact or occupy but a limited space.]

40,752.—Preserving Iron from Corrosion.—G. W. Holley, Niagara, N. Y.:

I claim protecting the surface of iron from corrosion by means of a glaze or coating, the composition for said glaze or coating being formed and applied substantially as herein set forth and described.

40,753.—Artificial Fuel.—J. H. Hubbard, Hartford, Conn.:

I claim congealing into a mass for a fuel as follows:—To fifteen tuns of anthracite coal or coal dust one tun of plaster-of-paris, or one tun of clay, or half and half of each to render it (the coal dust) useful for fuel, substantially in the manner and for the purpose as described.

40,754.—Steam Engine Governor.—J. D. Humphreys, London, England:

I claim a governor for regulating the speed of marine or other engines, consisting of an independent or separately-working engine, in combination with a fly wheel, said governing apparatus operating in a manner substantially as herein specified.

40,755.—Tethering animals.—Moses Johnson, Colebrook, N. H.:

I claim the said tethering apparatus made substantially in manner and so as to operate as described.

40,756.—Grain Separator.—Louis Pierre Josse, Paris, France. Patented in France Nov. 22, 1862:

I claim the general arrangement and combination of parts of the above-described apparatus for separating or cleansing wheat or other grain or seeds, and separating therefrom the chaff, dust or other extraneous matters or impurities mixed therewith, in which apparatus the separation of the chaff or lighter parts from the grain or seeds or heavier parts is effectuated by imparting a suitable horizontal reciprocating motion to a triangularly-shaped shallow box or boxes, in which fall the grain or seeds to be cleansed, by the effect of which motion and the configuration of the said box or boxes the chaff or lighter parts rise to the top of the grain, seeds, or heavier parts and travel and leave the said box or boxes in an opposite direction to that of these latter parts, substantially as described.

40,757.—Endless Saw.—George Kammerl, New York City:

I claim the peculiar chain saw blade formed of a number of teethed steel links, rolling as an endless chain continually in but one direction over the required pulleys, in the manner which this specification and drawings clearly show.

40,758.—Constructing Wagons, Carriages, &c.—John Kirkman, Peoria, Ill.:

I claim in combination with a wagon constructed as described, the springs, I′ I′, rods, I I, eccentrically pivoted arms or rods, f f, and rubbers, g g, all arranged and operating substantially as set forth.

[This invention relates to a wagon constructed entirely of iron and in connection with which an ingenious device is employed for automatically locking the wheels in passing down slopes.]

40,759.—Operating Wagon Brakes.—James H. Lee, Leavenworth, Kansas:

I claim, first, The combination with the brake lever, B, of a spring, G, to throw the said lever into the rack, F, automatically when drawn forward.

Second, The combination of the lever, I, spring, D, and lever, K, or cam, I′, operating to release the brake lever, B, and retract the brake, substantially in the manner described.

[By means of this invention the teamster is enabled to apply or release the brake at will, while seated upon his horse.]

40,760.—Corn Planter.—J. C. Leffel, Shelbina, Mo.:

I claim, first, The rock shaft, J, provided with the treadles, g g, and connected with the slide bar, D, through the medium of the arm, f, for the purpose of operating the slide bar, D, as set forth.

Second, The covering shares, L L, curved or bent of semi-circular form in their transverse section, rounded at their front ends and gradually contracted toward their back ends as set forth.

Third, Constructing the runners, A A, so as to be of beveled or taper form in their transverse section, as and for the purpose specified.

[This invention relates to a new and useful improvement in the seed-dropping device and seed-coverers, and also in certain peculiarities of construction relating to the runners of the machine, whereby it is believed that several important advantages are obtained over the ordinary corn planters in general use.

40,761.—Patching Minie Bullets.—Orrin D. Lull, Watkins, N. Y.:

I claim the use in a cartridge case of any suitable form of a patch or wrapper, W, constructed with a central aperture, w2, and a number of leaves, w′ w′ w′, adapted for wrapping around the base of the ball without wrinkling, doubling, or lapping; all as hereinbefore described and for the objects specified.

40,762.—Fruit Press.—John Manrow, Sacramento, Cal.:

I claim, first, The windlass, B, provided with the two ropes, l l′, in connection with the lever, I, having the follower rod or slide bar, J, attached by a joint, t, and secured on its fulcrum by a strap or rod, s, all being arranged to operate in the manner and for the purpose herein set forth.

Second, The curb, N, constructed of four sides, u u u′ u′, perforated with oblique holes as shown, in connection with the perforated boards, O, provided with channels, b′, all arranged to operate as specified.

Third, The slide bar, E, provided with the two pawls, F F, which are fitted between stationary pins, k k, and arranged in such relation with the toothed wheel, C, of the windlass, to operate as described.

Fourth, The combination of the windlass, B, ropes, l l′, lever, I, arranged as shown and with the follower or slide bar, J, attached as described, the curb, N, with perforated sides and the perforated boards, O, and with or without the boarded or weighted lever, A′, all arranged to operate as herein described.

40,763.—Artificial Limbs.—Amasa A. Marks, New York City:

I claim making feet and hands for artificial limbs of "sponge" or soft rubber, combined with "hard" rubber or wood, as and for the purpose herein set forth.

40,764.—Curd Agitator.—James H. Maydole, Eaton, N. Y.:

I claim, first, A curd agitator, consisting of a series of rods, arranged relatively as described, in combination with a shoe or scraper, provided with a thin edge, so as to pass under the curd and close to the bottom of the vat, for the purposes set forth.

Second, In combination with my improved curd agitator, a handle, so located upon the machine as that the forward end of said machine may be conveniently elevated or depressed during the operation thereof, substantially and for the purposes set forth.

Third, I also claim the employment of the handles arranged relatively as described, so as to enable the operator to lift the forward part of the machine by one hand and move it forward and back over the other as specified.

[illegible]-bandage for the Treatment [illegible], New York City:

[illegible] of a set of strings, [illegible] the bag in a circuitous or [illegible] at the sides of the same, which [illegible] opposite direction to each other, will contract such [illegible] or bag to any desired dimension, thereby adapting the [illegible] case, and make equal compression upon diseases existing within the testes or their appendages, thus relieving, preventing, or curing such diseases.

40,766.—Cultivator.—Samuel H. Mitchell, El Paso, Ill.:

I claim the arrangement and combination of transversely adjustable swivel bars, c, hinged plow beams, D, notched bars, H H, double tree, I, and bar, J, and connecting rods, h, and axle, A, provided with a number of holes, b b, intended to receive the swivel bars, c c, to which the beams, D D, are attached by means of pivots, d, the swivel bars, c c, adjustable in the holes in the axle so that the beams can be brought closer together or further apart, according to the width of the furrows; all constructed and operating in the manner and for the purpose shown and described.

[This invention relates to an improvement in that class of cultivators, in which the plows are secured to beams that are connected by means of swivel bars to an axle which is supported by two wheels. The beams can be adjusted closer together or further apart as may be desired and each plow is adjustable in a vertical and in a lateral direction.]

40,767.—Grain Separator.—J. A. & J. W. Miller, La Grange, Ind.:

We claim, first, Constructing the revolving conical screen, E, with sectional removable or detachable screens, k, arranged as described, so as to admit of coarser or finer screens being applied or used, as occasion may require.

Second, The combination and arrangement of the shoe, C, fan, B, spout, D, concave chute, D′, and revolving screen, E; as and for the purpose set forth.

Third, The spout, F, at the bottom of the shoe, C, in combination with the spout, G, opening, f, in the side of the box or case, A, slide, I, and drawer, H, or other receptacle, all arranged as and for the purpose set forth,

[This invention consists in the employment or use of a shoe provided with screws, and used in connection with a rotary conical screen fan and grain passages, all being arranged in such a manner as to admit of the device being very readily adapted for operating upon different kinds of grain.]

40,768.—Sad Iron.—Oscar F. Morrill, Chelsea, Mass.:

I claim my improved sad iron as constructed with its heat intercepting posts arranged in two ranges, disposed with respect to one another, and the induction and eduction passages, substantially in manner as specified.

40,769.—Drop Press.—Samuel Remington, Ilion, N. Y.:

I claim the employment of the lever, f, and its pin or screw, u, segment, g, and its adjusting holes with the adjustable roll, e′, when combined with roll, e, and the shifting rod, i, or its equivalent, as and for the purpose herein specified.

40,770.—Grain Drill.—Martin Rich, Horicon, Wis.:

I claim, first, A seeding machine so constructed that the seed hopper may be transferred from the front to the rear end of the frame, thereby adapting the same machine to sowing either broadcast or in drills, substantially as set forth.

Second, The drill tooth with the upper end constructed in the elongated form for the purpose set forth.

Third, The clearer, a, for freeing the teeth from rubbish, constructed and operated substantially as described.

40,771.—Railroad Frog.—Thomas Sharp, Chicago, Ill.:

I claim operating the adjustable bar, E, by means of the projection, D, thereon, the rods, F G, and elbow lever, I, when constructed arranged and operated in connection with the swith lever, H, as and for the purposes herein specified.

40,772.—Priming Metallic Cartridge.—Christian Sharp, Philadelphia, Pa.:

I claim charging metallic cartridge cases with detonate by introducing into each case a proper quantity of detonate in a fluid or semi-fluid state, and by a rapid revolving motion of the case projecting and packing the detonate into the interior of the flange or enlargement of the case substantially as described.

40,773.—Cooking Apparatus.—Joseph Singer, Chicago, Ill.:

I claim, first, Adapting the lowermost vessel, A, for receiving the heat of a lamp or gas burner, or of a charcoal furnace, by means of a perforated removable bottom plate, B, applied to the perforated bottom, B′, of said vessel, substantially as described.

Second, The portable cooking apparatus, constructed, arranged and operating substantially as described.

40,774.—Washing Machine.—Hamilton E. Smith, Pittsburgh, Pa.:

I claim the perforated cylinder, D, or its equivalent with its internal cage, the whole being constructed and arranged to revolve in a reservoir, substantially as described.

40,775.—Device for Operating Churns.—Henry Soggs, Columbus, Pa.:

I claim placing and operating the churn, H, in the swinging frame, B, (including the necessary operating mechanism), in combination with the sliding vent cover, P P′, so that the vent cover will slide back and forth on the top of the churn, and allow the dash rod a free perpendicular play, substantially as described.

40,776.—Cultivator.—Isaac and Stephen Stout, Tremont, Ill.:

We claim, first, The combination and arrangement of a front and rear frame in a cultivator when constructed in the manner and for the purposes described.

Second, The combination and arrangement in the rear frame of the cultivator of a drivers seat made adjustable and a standing support for the driver, a lever catch bar, studs for the supporting wheels, and a projecting connection, f, all operating substantially in the manner and for the purpose described.

Third, The combination and arrangement in the main or front frame of the cultivator, of the hinged lever, the central support for the middle plow handles and their braces, a lever-catch to regulate the depth of plowing and an adjusting device to change the line of draft, all operating substantially in the manner and for the purposes set forth.

40,777.—Farm Gate.—A. C. Teel, Girard, Ill.:

I claim the suspending of the gate, A, on strips, d d′, attached to posts, C D C′ D′, at the ends, B B, of the fence substantially as shown, to admit of the sliding of the gate and the turning of the same for the purpose of opening and closing it as herein set forth.

[This invention consists in a novel way of hanging gates whereby the use of hinges is dispensed with and the gate at the same time rendered capable of being opened and closed with equally as great facility as if it were hung upon hinges, the expense of the latter being therefore avoided without any disadvantage whatever.]

40,778.—Direct-action Steam Engine.—Thomas Thatcher, Danville, Pa.:

I claim, first, The two tappet levers, J J′, applied and combined with each other with the valve and with plungers, C C′, substantially as herein specified.

Second, The rim or casing, h h, around the exhaust port of the valve seal in combination with the two cavities, g and j, in the valve, substantially as and for the purpose herein specified.

[This invention relates to the operation of the slide valve of a direct-action engine. It consists first in a novel system of tappet levers for effecting the first [illegible] the stroke of the valve by which the port is closed to the steam [illegible], and, in a novel construction of the valve and seat for the purpose of completing the stroke of the valve by the agency of the exhaust steam.]

40,779.—Machine for fitting Pipe and other Boxes.—Wm. Thurber, Olean, N. Y.:

I claim, first, The skeleton face plate, or open revolving chuck, supported in its place by self-adjusting friction rollers on balanced axes, the rollers fitted to run in a groove in the periphery of the chuck, to which carriage wheels are attached, for the purpose of fitting in pipe or other boxes, constructed and operated in the manner herein specified.

Second, I claim the adjustable frame, to which the face plate is attached, in combination with the lever arm, rule scale and indicator, to give the hole in the hub the exact taper of the pipe box being fitted.

Third, I claim the arrangement of the hinged beam, Q, the sliding bar, h, and cutter, a, the regulating stop, k, and weight, m, with the reversible cone, I, for centering the wheel, in the manner as described, for the purposes herein set forth.

40,780.—Grain Drill.—W. W. Tuttle, Gratiot, Wis.:

I claim, first, The wings, a, attached to the shaft, F, and fitted in ellipsoidal recesses, b, for the purpose of discharging the seed from the box, E, as set forth.

Second, The scattering device formed of the spouts h i j, and the box, H′, arranged as set forth.

[This invention relates to a new and improved machine for sowing seed either in hills or drills or in a broadcast manner, and it consists in a novel and improved arrangement of means for distributing the seed and covering the same.]

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40,781.—Grate for Stove and Furnaces.—George Vander Heyden, Troy. N. Y.:

I claim, first, A series of fire-grate bars, B B B B, when the face sides of said series of bars are constructed in respectively graduated tapering forms, and such a degree of taper form of face being given respectively to the bars of the series as to produce, when the bars are properly arranged for use, respectively graduated air-draught spaces between the bars of said series, in the manner substantially as herein described and shown, and for the purposes specified.

Second, I claim in combination with the series of fire-grate bars, B B B B, as herein described, the use of inclined, auxiliary fire-grate bars, C C C C, so arranged in reference to the bars, B B B B, as to be easily detached from said bars without disturbing the same when necessary to renew a bar or bars, in the manner as herein shown and set forth.

Third, I claim the manner of uniting two or more fire-grate bars by means of the hollow or perforated bridges or ties, f f f, cast upon the faces of the bars, in the manner and for the purpose substantially as herein shown and described,

Fourth, I claim the combination of the cross-bars, D D, the auxiliary cross-bars, E E, the rods, F F, the saddle rods, G G G G, and the tie plates, I I I I; when arranged and suspended within the fire-box of a furnace by means of chains or hooks, or their equivalents, in the manner as herein shown and for the purpose set forth.

Fifth, I also claim in combination with the inclined auxiliary fire-grate bars, C C C C, the perforated bars, k k k k, for the purposes as herein shown.

40,782.—Hay Rake.—John Wallace & Daniel Carpenter, Goshen, N. Y.:

I claim the arrangement of the double-shouldered cams, I, and spring dogs in combination with the teeth, H, and hinged arms, F, constructed and operating in the manner and for the purpose substantially as specified.

[This invention relates to a horse-rake in which a series of independent revolving teeth are employed, each tooth being secured to an independent hinged arm and provided with a double notched or shouldered cam and spring catch, in such a manner that each tooth is perfectly free to accommodate itself to the sinuosities or unevenness of the ground and the several teeth can be discharged simultaneously by withdrawing the spring catches, and, after having made one half a revolution, stopped or retained in the proper working position by throwing the catches into the second notches or shoulders.]

40,783.—Stave-cutting Machine.—Peter Welch, Oswego, N. Y.:

I claim, first, The combination of the lever, D′, shaft, P, wheels, R and S, and racks, T and U, substantially in the manner and for the purpose described.

Second, The combination of the double-racked arm j, with the pawls, k and n, arranged and operating substantially as specified.

Third, The combination and arrangement for conjoint operation of the pawls, k and n, the stop, d, and the spring catch, c, substantially in the manner and for the purpose described.

40,784.—Machine for Jointing Staves.—Peter Welch, Oswego, N. Y.:

I claim the combination of the carriage, Y, slide, W, wheel, S, shaft, R, shaft, N, and lever, M, with the jointing saws, substantially in the manner and for the purpose described.

I also claim the combination of the gage, V, with the lever, M, so that it is operated at the same time and in the same proportion as the saws, substantially in the manner and for the purpose set forth.

40,785.—Chimney and Shade for Lamps and other Lights.—Marian J. Wellman & J. J. Greenough, New York City:

I claim the employment of perforated metal or wire gauze for the chimneys, shields, or screens aforesaid, by which the temperature is kept low, as and for the purposes set forth.

40,786.—Potato Digger.—Albion Wheeler, Mallory, Iowa:

I claim the arrangement of the hinged adjustable platform, F, with castor-wheel, d, in combination with the digging cylinder, E, conveyor, H, and slatted apron, I, all constructed and operating in the manner and for the purpose herein shown and described.

40,787.—Carriage Spring.—Gallus Woeber, Davenport, Iowa:

I claim the lugs, h, projecting from the edges of the leaf, d, of a spring, A, and operating in combination with the pins, g, and leaves, c b, in the manner and for the purpose substantially as specified.

[This invention consists in the arrangement of lugs or ears project ing from the edges of the leaf over and beyond the edges of the succeeding leaves, and provided with pins passing through said lugs close over the inner leaves of a carriage spring, in such a manner that, by the action of said lugs and pins, the leaves are firmly held together and prevented from springing apart or from shifting laterally, without weakening the leaves by holes and by means which are cheap, simple and perfectly reliable.]

40,788.—Cooking Stove.—H. G. Wood, Buffalo, N. Y.:

I claim the fire-pot, D, suspended or supported in an air chamber, E, which surrounds the fire-pot on all sides except underneath it, in combination with an oven having flue spaces, G G′, leading from the air chamber and surrounding the oven, arranged substantially in the manner set forth.

40,789.—Corn Planter.—G. J. Bergen, Galesburgh, Ill.:

I claim, first, The combination in a seed planter of a front frame carrying the seeding mechanism and a dropman's seat, and a rear frame carrying a coupling windlass and a driver's seat with the slotted coupling, substantially as described for the purposes set forth.

Second, Balancing the front and rear frames of a seed planter by a windlass, substantially in the manner and for the purposes set forth.

Third, The windlass, C, to balance the front and rear frames or control the depth of planting in a seeding machine, or to regulate the weight of the tongue upon the team, as set forth.

Fourth, The combination of the chain fastened to either frame, with the windlass, and running spirally around it to vary the leverage, substantially as described and set forth.

Fifth, The revolving seat for the dropman combined with a seed planter, constructed and operating as and for the purpose described.

Sixth, The combination of the dropman's seat with the driver's seat and with the windlass, substantially as described and for the purposes set forth.

Seventh, The indicating spring with its ribs constructed and operating substantially as described.

Eighth, The slotted joint connecting the front and rear frames, when the draft of the rear frame is effected alone by such coupling, and so as to allow a vertical movement of the front or rear frame, as and for the purpose set forth.

40,790.—Swivel Hook for Watch Chains, &c.—Louis Bornemann, Hudson City, N. J., assignor to August Hamann, Hoboken, N. J.:

I claim, first, The semicircular shank, d, of the movable part, C, of the hook, in combination with the screw barrel, c, and shank, a, of the stationary part, A, constructed and operating in the manner and for the purpose substantially as shown and described.

Second, The stop, e, in the end of the semicircular shank, d, in combination with a groove or its equivalent in the stationary shank, a, as set forth.

[The object of this invention is a swivel hook which will open and close by the action of a screw barrel without a hinge and by a positive motion, in such a manner that by imparting to said screw barrel rotary motion, the movable part of the hook will slide in and out, and that the hook, when it is closed, is not liable to open spontaneously.]

40,791.—Non-fusible Fuel.—William Budd (assignor to L. G. Marshall and Andrew Cochran), Philadelphia, Pa.:

I claim the combination of the several materials as hereinbefore set forth, with or without the proportions and manipulation, so as to make a non-fusible fuel, also the use of molasses in any other compound for fuel.

40,792.—Training Hops.—F. W. Collins, Morris, N. Y., assignor to himself and W. H. Pratt:

I claim an apparatus for training hops reduced by the combination of a pole in each hill of the proper hight only to support the hop to the bearing point, with cords or twines, or their equivalent, connecting each of these poles with the poles of each adjacent hill, substantially as and for the purposes set forth.

40,793.—Horse Rake.—Jacob Farmwalt, German Township, Ohio, assignor to Arthur Graham, Clark's P. O., Coshocton Co., Ohio:

I claim the jointed arms, H H, and brace guides, J J, in combination with the shaft, C, provided with spring teeth and axletree, F, when arranged in the manner and for the purpose set forth.

I also claim the levers, K and L, with their respective pivot joints and rack, R, in combination with the shaft, C, jointed arms, H H, when arranged in the manner as and for the purpose described.

40,794.—Stereoscopic Apparatus.—S. D. Goodale (assignor to L. C. and D. C. Goodale), Cincinnati, Ohio:

I claim, first, The stand or tripod, formed of the members, A B B B C C C C′ C′ C′, as and for the purpose set forth.

Second, The arrangement of hinged lens-holder, G g, and flap, F f, together with their catches, H and I, both holder and flap being capable of being closed or opened by a single movement, in the manner described.

Third, The arrangement of blinds, J J′, catches, K K′, and segmental slots, L L′, as set forth,

Fourth, The arrangement of reflectors, M, box, D, and scene holder, S, substantially as set forth.

Fifth, The provision of lips, N N′, beneath the box, for the purpose stated.

40,795.—Blinds for Windows, &c.—Henry Hoffman (assignor to Charles Wehle), New York City:

I claim the construction of blinds, shutters, awnings or reflectors, consisting of a series of plates, P P1 P2 P3 P4, combined with the levers, D D′ E E′ F K′ G L′ and H N′, with their several pivots and connecting levers intended to be attached to a door or window by an arrangement for raising or lowering the same, substantially as described.

40,796.—Balanced Valve for Steam Engines.—C. H. Parshall, Detroit, Mich., assignor to Parshall & Duncan:

I claim, first, The plate, S, interposed between the valve, O V, and the cover, H, of the valve chest, and supported by standards, L L′ L″ L‴, substantially as herein shown and described.

Second, The combination of the balanced valve, O V, plate, J, cover, H, and curved pipe, Y, all constructed, arranged and operated as specified.

[This is an ingenious and effective device for relieving a slide valve of pressure upon its seat. It is readily applicable to engines already in use, requires no enlargement of the valve chest, and admits of the use of a cut-off of any form.]

40,797.—Cask-washing Machine.—Wm. Robinson, Wembdon, Bridgewater, England, assignor to G. B. Turrell, New York City. Patented in England, December 20, 1859:

I claim an apparatus, substantially such as herein described, whereby a compound motion can be imparted to the cask, barrels, or other vessels, simultaneously in two or more directions.

Also the combination of the rotating frame, B, serrated ring, C, screw clamp, D, carriages, E, and eccentrics, E, constructed and operating in the manner and for the purpose substantially as herein shown and described.

[An engraving of this invention, with full description, appeared on page 353, current volume of the Scientific American.]

40,798.—Stereoscope.—C. H. Wheeler, West Roxbury, Mass., and J. A. Bazin, Canton, Mass., assignors to C. H. Wheeler aforesaid:

I claim, first, The board or bed plate, A, in combination with the hinged eye-glasses, C, and longitudinally-sliding picture-holder, B, constructed and operating in the manner and for the purpose substantially as shown and described.

Second, The longitudinally-sliding adjustable field piece, E, in combination with the bed plate, A, hinged eye-glasses, C, and adjustable picture holder, B, as and for the purposes set forth.

Third, Connecting the eye-glasses, C, to the head-piece, D, by means of a pivot, f, substantially as and for the purpose described.

Fourth, The spring catch, e, in combination with the hinged head-piece, D, bed-plate, A, and eye-glass, C, constructed and operating as and for the purpose set forth.

Fifth, The combination of the parts, a b c, of the bed plate with each other and with the picture holder, B, substantially as and for the purpose herein set forth.

[An engraving and full description of this invention was published on page 384, current volume of the Scientific American.]

40,799.—Protecting the Walls of Fire-proof Safes from Corrosion:

I claim the method herein described of protecting the parts of fire-proof safes from dampness or corrosion, by the employment and application, as a coating, of the surfaces of the iron in contact with the filling and for hermetically sealing the joints of liquid quartz, substantially as hereinbefore set forth.

40,800.—Composition for Filling Fire-proof Safes.—W. K. Marion, New York City:

I claim the herein-described compound for filling safes and other fire-proof structures, the same consisting in the combination with calcined and powdered gypsum, of alum, in pieces, imbedded in and interspersed through the mass of plaster in such relative proportions as that the water of crystallization of the alum which may be evolved by heat, shall supply therequisite quantity of water to set the plaster, substantially as and for the purposes set forth.

40,801.—Covering Cords, Wires, &c.—Frederick Beck, New York City:

I claim the employment or use of flock or powder obtained by grinding woolen worsted or cotton, rags or paper, or other material, in combination with a solution of glue or other suitable cement, for the purpose of covering cords or wires, substantially as set forth.

40,802.—Attaching Rubber Soles to Boots and Shoes.—D. E. Hayward, Melrose, Mass.:

I claim securing nails or rivets, a, to the rubber sole, B, by vulcanizing the sole on to the nails or rivets, substantially in the manner described.

Second, I claim the canvas cloth, c, when the nails or rivets, a, are passed through it, and the cloth and nails are attached to the sole in the manner substantially as set forth.

RE-ISSUES.

1,581.—Photographic Album.—Altemus & Company, Philadelphia, Pa., assignees of J. D. Mets, Dubuque, Iowa, Patented July 21, 1863:

I claim, first, A photographic album or other book consisting of a succession of leaves hinged together, substantially as described.

Second, The use of the perforated plates, a, secured to the leaves, and hinged together, substantially as set forth.

1,582.—Railroad Rails.—T. S. Blair, Pittsburgh, Pa. Patented May 19, 1863:

I claim, as a new article of production, useful in the arts, to wit, a tempered or untempered railway rail, partly iron and partly steel, carbonized and re-rolled, substantially in the manner and for the purpose hereinabove described.

1,583.—Wooden Pavement.—Samuel Nicholson, Boston, Mass. Patented August 8, 1854:

I claim the so combining or arranging the foundation or support, or its equivalent, of said wooden pavement resting on the roadway surface or bed, substantially as herein described, with said long and short blocks above described, or their equivalents, which said blocks are combined in such a manner as that partitions shall be made leaving cells or channels between them with a wooden bottom formed by the shorter blocks some distance above the lower end of the blocks, for the reception of the broken stone or gravel and tar or other like material, and also combined with such cells or channels filled with broken stone, gravel and tar, or other like material, substantially as herein described, having such wooden bottom to rest upon, substantially as herein described, whereby the particles of broken stone or gravel are prevented from working under the lower ends of the longer blocks, and whereby water is prevented from passing from the surface of the pavement downward through the joints of said wooden blocks, and also moisture is prevented from being absorbed upward from the ground by said wooden blocks, substantially as herein described.

1,584.—Securing Bottle Stoppers.—Thomas Pinner (assignee of John Alexander), New London, Conn. Patented July 24, 1855:

I claim forming the confining strap of a permanently-attached bottle cork fastener, in the manner and for the purpose substantially as set forth.

I also claim corking and fastening the cork by the combination of the plunger and of a confining strap, such substantially as is herein described, whereby the cork may be permanently secured before the bottle is removed from the filling machine, as set forth.

1,585.—Steam Boiler.—T. T. Prosser, M. C. and K. A. Darling (assignees of T. T. Prosser), Fond du Lac, Wis. Patented August 11, 1863. Ante-dated January 31, 1863:

We claim, first, The application of the exhaust steam of a steam engine to the exterior surface or surfaces of a steam boiler or boilers, or any part thereof, for the purpose of utilizing the latent and sensible caloric thereof, in the production of more steam.

Second, The chambers, A A′ A″ A‴, severally or in combination.

Third, The chambers, A A′ A″ A‴, severally or collectively, in combination with one or more tubes or flues of a steam boiler, in the manner and for the purpose set forth.

Fourth, using one or more of the tubes or flues ordinarily used for the transmission of the products of combustion from the fire chamber to the chimney or smoke stack, for the reception of the exhaust steam of an engine, for the purpose set forth.

Fifth, Introducing a flue or flues, a tube or tubes, into the water space of a steam boiler and using it or them for the reception of the exhaust steam of an engine, for the purpose set forth.

1,586.—Channeling Soles of Boots and Shoes.—Martin Wesson, Springfield, Mass. Patented May 24, 1859:

I claim, first, The combination of one or more feed rolls, E F, knife or knives, b b, and guide, R, or its mechanical equivalent, when operating substantially in the manner and for the purpose herein set forth.

Second, The combination of lever L, sliding pieces, h h′, and knives, b b′, when arranged and operating, as described, and forming a knife-holding arrangement, for the purpose specified.

DESIGNS.

1,870.—Clock Dial.—George Hilis, Plainville, Conn.

1,871, 1,873 and 1,874.—Stove Plates.—D. E. Paris and N. S. Vedder, Troy, N. Y., assignors to the said D. E. Paris.

1,872.—D. E. Paris and F. E. Ritchie, Troy, N. Y., assignors to D. E. Paris, aforesaid.

1,875.—Fire-place Stove.—Garrettson Smith and Henry Brown, Philadelphia, Pa., assignors to C. S. Collins and E. S. Heath, Baltimore, Md.

IMPORTANT TO INVENTORS

PATENTS FOR SEVENTEEN YEARS.

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On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (but in cases of de-

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THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent free of charge. Address MUNN & CO., No. 37 Park Row, New York.

signs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

During the last seventeen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted, by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the inventors throughout the country we would state that we have acted as agents for at least TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees at home and abroad. Thousands of inventors for whom we have taken out patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the inventors whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in our extensive offices, and we are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of rejected cases on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with us on the subject, giving a brief history of the case, inclosing the official letters &c.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The Government fee for a caveat, under the new law, is $10. A pamphlet of advice regarding applications for patents and caveats, printed in English and German, is furnished gratis on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

FOREIGN PATENTS.

We are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business we have offices at Nos. 66 Chancery lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through the Scientific American Patent Agency, No. 37 Park Row, New York.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency, the requirements of different Government Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park Row, New York, or any of our branch offices.

ASSIGNMENTS OF PATENTS.

Assignments of patents, and agreements between patentees and manufacturers are carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

It would require many columns to detail all the ways in which inventors or patentees may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of patentees will be cheerfully answered.

Communications and remittances by mail, and models by express prepaid), should be addressed to MUNN & CO., No. 37 Park Row, New York.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

VARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on design patents when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgment of our reception of their funds

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
No. 37 Park-row, New York.

Binding the "Scientific American."

It is important that all works of reference should be well bound The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preparved by a large class of its patrons, lawyers and others, for reference some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII. to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row, New York.

Back Numbers and Volumes of the Scientific American

VOLUMES I., II., III., IV., V., VII. AND VIII. (NEW SERIES) complete (bound) may be had at this office and from periodical dealers. Price, bound, $2 25 per volume, by mail, $3—which includes postage. Every mechanic, inventor or artizan in the United States should have a complete set of this publication for reference. Subscribers should not fail to preserve their numbers for binding. VOL. VI. is out of print and cannot be supplied.

Notes and Queries

E. L. W., of N. Y.—The hight of the atmosphere is supposed to be between 45 and 50 miles, but there is no absolute certainty on this point. The calculations made respecting its hight have been based upon the pressures taken at different altitudes.

W. A. M., of Mass.—The best solution that we have tried to render cloth water-proof and yet porous to the air, is made with the acetate of lead and sulphate of alumina. Take 4 ounces of alum and 2 ounces of the sugar-of-lead; dissolve them separately in half a gallon of water each. Now mix them, stir thoroughly and allow the sediment to settle for two hours. Pour off the clear, handle the cloth in this until it is saturated and dry it in a warm room. Give two dips and dry after each.

S. S. & Co.—Your plan to exhaust the smoke box of air, or rather to apply the blower at that point, is a good one if you can make it work. We imagine, however, that some difficulty would be experienced in the passage of the smoke through the fan or exhausting apparatus to the chimney. The usual method of introducing air through the furnace is the most feasible. Use a Dimpfel blower. Slippery elm (powdered) is good to loosen scale in boilers; put in two ounces per horse-power.

W. C., of C. W.—We are surprised that you should ask us if condensed water from the worm would run back into the boiler against steam pressure. The impracticability of the thing would strike anybody at once.

T. D. L., of N. H.—You cannot employ a syphon for elevating water from a lake over a bank to be employed to any practical purpose in operating a water wheel. Cut a race through the bank and bring the water to the wheel by direct gravitation.

G. L., of Mass.—The opinon which you entertain that if the shot in a gun is not crammed down close upon the powder the gun will burst when discharged, does not accord with some experiments made with guns, an account of which was published on page 254, Vol. III. (old series) of the SCIENTIFIC AMERICAN. The experiments were conducted by Captain Stockton, of the Navy, with the following results:—With the shot "rammed home" the bursting charge of powder was 6⅔ ounces; with a space of two inches between the shot and powder, the bursting charge was 7¾ ounces; with a space of four inches between them, the bursting charge was 8 ounces; with a space between them of 6 inches, the bursting charge was 9¾ ounces. Your suggestion respecting welding some kinds of forgings by heating the metal with a blow-pipe is good and has been successfully carried out in some cases already. Winged rifle shot are objectionable because they meet with too much resistance from the atmosphere. Pointed shot is inferior to round and flat-fronted projectiles for penetrating thick iron plates.

A. S. R., of N. H.—If your bail wire is bright and brittle put it into an oven until it assumes a blue color, then allow it to cool slowly, when it will be somewhat softer. You can anneal it by covering with sand and subjecting it to heat from a fire, and afterwards allowing the wire to cool slowly, but it is liable to become black. For a flat roof tin is the best material that you can use. There is an excellent roofing material illustrated on page 176, Vol. VIII. (new series) of the SCIENTIFIC AMERICAN. A mixture of equal parts of asphaltum and coal tar boiled in a cauldron for two hours and mixed with dry sand, makes a cheap roofing material, laid upon the top of thick tar paper, then covered over the surface with fine gravel.

G. G., of N. Y.—It has so happened that two distinct patents have been issued for the same thing, but through an oversight on the part of the Examiner, as two patents cannot equally exist for the same invention. When two patents have been granted for the same invention the patent would belong to the original and first inventor, and the subsequent inventor could not use the improvement without infringing the rights of the first.

D. B., of C. W.—Reading pig iron, manufactured in Pennsylvania, will answer well for making very strong and durable gearing, mixed with a limited quantity of Scotch pig. The latter should never be employed for large castings that are to be subjected to severe strains; because, although it flows very freely and produces a smooth skin, the castings are liable to have flaws and honeycombs in their interior. Most American pig iron is excellent for gear wheels, and that made from Lake Superior ore has now a high reputation.

H. W., of N. Y.—There is no difficulty to be apprehended of the kind you mention in using a gas stove.

G. H., of N. Y.—Your plan of coating a telegraph wire with lead is too slow and tedious a process and not likely to be adopted by any company.

M. K., of N. C.—Your scheme is not feasible in practice The danger of handling gun-cotton in the manner proposed, as also the nature of the invention, render it unlikely to be of any practical value.

D. B., of N. Y.—The substance which you have forwarded to us will answer very well for paper stock, but it is too brittle to be employed for spinning and weaving into cloth. The most important question connected with it is its cost.

NOTE.—To those correspondents who write to us concerning mechanical books and where to obtain them we would say examine the advertising pages of the SCIENTIFIC AMERICAN and you will be informed.

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, Dec. 2, to Wednesday, Dec. 9, 1863:—

F. A. De M., of N. Y., $16; H. F., of N. Y., $41; A. B. L, of N. Y., $41; H. S., of N. Y., $20; E. R. R., of N. J., $20; J. F. D., of N. Y., $26; G. B. McD., of Ky., $20; S. S., of N. J., $10; I. B., of N. J., $20; S. B. C., of N. Y., $20; E. H. B., of Pa., $20; G. P. G. of N. Y., $16; M. A. J., of Mass., $45; R. L. S., of Conn., $16; F. C., of Mass., $16; J. N., of Ill., $16; P. R., of Conn., $16; T. H., of N. H., $28; A. B. G., of N. Y., $16; W. H. W., of Wis., $35; G. S., of Maine, $21; F. B. H., of Ind., $222; E. H. F., of Iowa, $16; A. B. & N. H. S., of Vt., $35; J. B., of Ohio, $45; A. L. S., of Conn., $16; G. P. S., of N. Y., $19; S. F., of N. Y., $25; A. C. C., of N. Y., $25; V. & M., of N. Y., $20; A. J. C. P., of La., $41; G. A., of N. Y., $41; T. H. & H. J., of N. Y., $45; S. A. S., of N. Y., $16; A. C. E., of Mass., $20; J. B. S., of Mich., $70; E. P., of N. Y., $41; J. L. G., of N. Y., $20; J. McC., of N. Y., $20; B. & H., of Conn., $20; A. G., of N. Y., $10; C. S., of N. Y., $20; W. G., of Ind., $16; H. H., of R. I., $60; J. M. C., of Oregon, $16; J. S. G., of Mich., $26; G. A., of Iowa, $15; A. D. L., of Mass., $16; N. B., of Ill., $16; N. A., of Ohio, $15; J. J. E., of N. Y., $112; J. H. Q., of N. J., $30; T. J. V., of Conn., $359; O. D. D., of Mich., $25; H. D., of Ohio, $16; H. W. C., of Vt.; $31; A. J. C. P., of La., $25; J. S., of N. Y., $25; A. S., of N. Y., $16; R. D. C., of England, $60; R. W. C., of N. Y., $45; H. J. Van T., of N. Y., $45; R. H. G., of N. Y., 20; C. W. & W. W., M., of Ill., $20; W. & M., of Germany, $20; I. E. P., of Conn., $10; W. P. B., of N. Y., $16; L. H., of N. Y., $31; O. L. G., of N. Y., $31; G. L. T., of N. Y., $46; R. W., of N. Y. $25; D. P. S., of N. Y., $25; V. H. H., of N. Y., $10; C. W., of Iowa, $10; R. S. H., of Iowa, $20; E. D. A., of Conn., $25; A. S. H., of Mich., $25; E. S. N., of N. J., $15; E. Y., of Mich., $16; J. G. B., of Mass., $25; D. B., of N. Y., $25; S. M. P., of Ohio, $10; E. H., of N. Y., $72; W. C. M., of N. Y., $25; J. F. D., of N. Y., $26.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have not received an acknowledgement by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, Dec. 2, to Wednesday, Dec. 9, 1863:—

J. F. D., of N. Y.; H. W. C., of Vt.; A. J. C. P., of La.; J. S., of N. Y.; G. A., of N. Y.; N. C. S., of Conn.; R. B. C., of Mass.; R. W., of N. Y.; W. H. W., of Wis.; J. C., of Ohio; W. E. D., of N. Y.; D. B., of N. Y.; E. H., of N. Y. (3 cases); W. C. M., of N. Y.; J. F. D., of N. Y.; H. F., of N. Y.; E. P., of N. Y.; S. & M. P., of Pa. (2 cases); C. F., of Iowa; J. G. B., of Mass.; J. H. Q., of N. J.; E. D. A., of England; J. S. G., of Mich.; D. & C., of N. Y.; J. B., of Ohio; G. P. S., of N. Y.; S. F., of N. Y.; A. C. C., of N. Y.; A. E. L., of N. Y.; L. H., of N. Y.; J. B. McC., of Mo.; A. S. H., of Mich.; G. S., of Maine; D. P. S., of N. Y.; T. H., of N. H.; H. H., of R. I. (2 cases); A. B. & N. H. S., of Vt.; S. M. P., of Ohio.

RATES OF ADVERTISING.

Twenty-five Cents per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that en words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

FOWLER'S ADDING MACHINE:—THE BOOK-KEEPER and Accountants Friend. Used in the counting-house for adding up columns in the ledger. For tallying lumber, weights of metals, hides, coal, &c. Also for taking the number of yards (or fractions of yards), in dry goods, account of stock, registering cash sales of the day, &c. Price with full directions $5. inclose red stamp for circular. First class agents wanted. Address G. B. FOWLER & CO., 37 Park Row, New York, or Box 3,213 Chicago, Ill. 1*

THE "WOKKING FARMER" FOR 1864.—THIS STERling agricultural publication—established by Prof. James J. Mapes, in 1843—enters upon its sixteenth volume with the January number. It will contain during the year more agricultural matter, adapted to all the States in the Union, than any publication of the day. Each new subscriber for 1864, will receive the December number, now issued, *free*, besides a valuable Grape Vine, or one of the following engravings, viz: "Merry-making in the Olden Time;" "Niagara Falls;" "Our Generals in the Field;" or "Crucifixion." Every applicant for this premium must remit 10 cents to prepay postage. Terms of "THE WORKING FARMER" $1 per annum in advance. Single copies 10 cents. Send your subscriptions at once and get the premiums. Specimen copies for the use of Canvassers, and Circulars, containing a list of our valuable premiums, sent on application to the Publisher, WM. L. ALLISON, Nos. 124 and 126 Nassau street, New York. 25 3

A RARE CHANCE.—"SCIENTIFIC AMERICAN" FOR Sale.—One set old and new series, well bound, perfect and complete, except the first volume of old series, 22 volumes. Price $100. One set of old series complete, except volumes 1 and 3, well bound and in perfect order. Price $48. Also a number of complete volumes unbound of old series, cheap, and several hundred numbers from every volume of old series, which I will sell for 10 cents per number to complete sets. Address SCIENTIFIC, Post-office Box 123, Washington, D. C. 25 2*

PATENT SOLID EMERY WHEELS.—THE NEW YORK Emery Wheel Company, are prepared to fill promptly all orders for their improved wheels, in quantities. Sample wheels sent on receipt of price as per circular. For cutting (metals or glass) grinding or polishing, a wheel will save its cost in one day's work. Office 51 Beekman street, New York. 25 4

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TO CAPITALISTS.—A PARTNER WITH $10,000 IS wanted in an established manufacturing business. The article is patented and meets with ready sale at a good profit. Address A. B., 210 Elm street, Newark, N. J. 25 2*

PATENT RIGHT OF A GREATLY IMPROVED DRILLING Machine for blacksmith's use, &c., for sale at one-fourth of its value. Address Post-office Box 534, New London, Conn. 1*

TO LEASE OR FOR SALE THE ONLY VACANT mill lot on Paterson race. For further particulars apply to G. SHIFF, 17 William street, room 27 up-stairs, New York, or to JAMES SPEAR, Paterson, N. J. 25 10*

GIFTS FOR THE HOLIDAYS.—PARR'S TOOL Chests fitted with complete sets of tools, sharpened and set ready for use and packed in cases for shipping. Suitable for mechanics, amateurs, farmers and boys; prices from $2 to $35 each and containing from 8 to 92 tools, according to size. Shipped on receipt of price. Send for descriptive circular to the manufacturer, GEORGE PARR, Buffalo, N. Y. 25 1

DENTIST'S AND LECTURER'S NITROUS OXIDE Apparatus improved, with full directions, for $16. Best rubber gas bags from 2 to 150 gallons capacity. Chemical apparatus and pure chemicals. A. W. SPRAGUE, 6 Tindall street, Boston. 25 2*

FOR SALE A SMALL STEAM BOILER AS GOOD as new, 12 feet long, 19 inches diameter, with all fixings complete for setting up, price $70, by I. & C. SMITH & CO., Stockport, N. Y. 25 2*

JUDD'S REVOLVING CYLINDER STEAM ENGINE.—In consequence of the many letters of inquiry, drawn out by the recent publication of this engine, in this paper, of its advantages over others, the subscriber hereby replies, that it will save about 33 per cent. of fuel, and that the cost of the engine is but about 60 per cent. The price for the right to build and use, is $10 per horse-power. ALLEN JUDD, Carlton House, Springfield, Mass. 1*

INCRUSTATIONS PREVENTED WITHOUT INJURY.—Winans's Powder eight years in use, no better reference needed except a trial. Cost about 10 cents a day. H. N. WINANS, 11 Wall street, New York, 24 4*

GREAT WESTERN WIND WHEEL.—THIS WHEEL is self-regulating and has other advantages over all other wind wheels in use. It is unequaled for driving machinery. Some valuable territory for sale. For full particulars address H. J. WENTWORTH, Norvell, Mich. 24 2*

LICENSES TO MANUFACTURE W. P. PENN'S Patent Grain Drill and Grass Seed Sower, and the St Clair Harvester, Reaper and Mower. Inquire of AMOS BROADUASE, Esq., 181 Broadway, New York City, or of W. P. PENN, Belleville, St. Clair county, Ill. 24 3*

ECONOMY OF FUEL.—NO USE FOR CHIMNEYS.—Engineer Gerner's system saves fully 50 per cent of fuel. One thousand six hundred factories and steamers have been fitted. Drawings and models showing the application of this system to different kinds of furnaces can be seen and all information obtained. Pamphlets free on application. J. E. STEVENSON & CO., Agents, 209 Broadway, New York. 24 4*

STEAM ENGINES FOR SALE.—A GOOD SECOND-HAND double Steam Engine of 160 horse-power, making two single engines of 80 horse-power. Will be sold low, single or together. Apply to DAVID S. BROWN & Co., 44 and 46 South Front street, Philaphia, Pa. 24 2*

PROPOSALS FOR TIMBER FOR THE NAVY.

BUREAU OF ORDNANCE, NAVY DEPARTMENT,
November 16, 1863.

Sealed Proposals, indorsed "Proposals for Timber," will be received at this Bureau until 3 o'clock P. M., of the 20th day of December next, for furnishing and delivering under contract, at the several Navy-yards at Portsmouth, N. H., Boston, New York, and Philadelphia, the following described timber and plank, for Ordnance purposes:—

Class 1. White Oak for Gun Carriages.
Class 2. White Pine and White Wood.
Class 3. White Ash and Hickory.
Class 4. Gum Logs.

Separate offers must be made for the supply at each of the Navy-yards named, and for the White Oak and the Hickory, White Wood, White Ash, and Pine; but the offers must be for all of each description for each Navy-yard.

Bidders are referred to the Ordnance officers at the several Navy-yards and stations, and to the Chief of the Bureau of Ordnance, Navy Department, who will furnish them with printed schedules, giving description of the "Timber," time of deliveries, and other particulars. H. A. WISE, Chief of Bureau. 23 4.

PROPOSALS FOR MORTAR SHELLS.

ORDNANCE OFFICE, WAR DEPARTMENT.
WASHINGTON, Nov. 18, 1863.

Sealed Proposals will be received at this office until 0 o'clock P. M., on the 22d of December next, for the delivery of fifty thousand 10-inch mortar shells, in the following quantities at the following arsenals, viz:—

At the Watertown Arsenal, Watertown, Mass., 5,000.
At the Watervliet Arsenal, West Troy, N. Y., 5,000.
At the New York Arsenal, Governor's Island, 25,000.
At the Alleghany Arsenal, Pittsburgh, Pa., 5,000.
At the U. S. Arsenal, Washington, D. C., 5,000.
At the U. S. Arsenal, St. Louis, Mo., 5,000.

These shells are to be made of the kind of metal, and inspected after the rules laid down in the Ordnance Manual. Drawings can be seen at any of the United States Arsenals. The shells are to be inspected at the foundry where cast, free of charge for transportation, or handling until delivered at the Arsenal.

Deliveries must be made at the rate of not less than five per cent. per week of the number of projectiles contracted for; the first delivery to be made within twenty days after the date of the contract, and any failure to deliver at a specified time will subject the contractor to a forfeiture of the number he may fail to deliver at that time.

Separate bids must be made for each Arsenal if the bidders propose to deliver at more than one. No bid will be considered from parties other than regular founders or proprietors of works, who are known to this Department to be capable of executing the work contracted for in their own establishments.

Each party obtaining a contract will be required to enter into bonds, with approved sureties for its faithful execution.

The Department reserves the right to reject any or all bids, if not deemed satisfactory, for any cause.

Proposals will be addressed to "Brigadier-General George D. Ramsay, Chief of Ordnance, Washington, D. C.," and will be endorsed "Proposals for Mortar Shells." GEORGE D. RAMSAY,
23 3 Brigadier-General, Chief of Ordnance.

NERVOUS DISEASES AND PHYSICAL DEBILITY, arising from Specific causes, in both sexes—new and reliable treatment, in Reports of the Howard Association—sent in sealed letter envelopes, free of charge. Address Dr. J. SKILLIN HOUGHTON, Howard Association, No. 2 South Ninth street, Philadelphia, Pa. 24 12*

SAVING OF FUEL TO PARTIES USING STEAM.—DAMPER REGULATORS.

Guaranteed to effect a great saving in fuel, and give the most perfect regularity of power. For sale by the subscribers, who have established their exclusive right to manufacture damper regulators, using diaphragms or flexible vessels of any kind. CLARK'S PATENT STEAM AND FIRE REGULATOR COMPANY No 5 Park Place, New York. 24 26*

A VALUABLE WORK FOR INVENTORS PATENTEES AND MANUFACTURERS.

The publishers of the SCIENTIFIC AMERICAN have just prepared, with much care, a pamphlet of information about Patents and the Patent Laws, which ought to be in the hands of every inventor and patentee, and also of manufacturers who use patented inventions. The character of this useful work will be better understood after reading the following synopsis of its contents:—

The complete Patent Law Amendment Act of 1861—Practical Instructions to Inventors, how to obtain Letters Patent, also about Models—Designs—Caveats—Trade-marks—Assignments—Revenue Tax—Extensions—Interferences—Infringements—Appeals—Re-issues of Defective Patents—Validity of Patents—Abandonment of Inventions—Best Mode of Introducing them—Importance of the Specification—Who are entitled to Patents—What will prevent the Granting of a Patent—Patents in Canada and European Patents—Schedule of Patent Fees; also a variety of miscellaneous items on patent law questions.

It has been the design of the publishers to not only furnish, in convenient form for preservation, a synopsis of the PATENT LAW and PRACTICE, but also to answer a great variety of questions which have been put to them from time to time during their practice of upwards of *seventeen years*, which replies are not accessible in any other form. The publishers will promptly forward the pamphlet by mail, on receipt of six cents in postage stamps.

Address MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, No. 37 Park Row, New York. 9

$200, $150, $100, $50 PREMIUMS.—TO EDITORS, Ladies and Others. I will pay the above-named amounts for the best four articles on either my Soap, Saleratus, or Concentrated Potash. The article must state the writer's experience in using the goods, and must be not less than ten lines, and be published in the editorial columns of any good family newspaper. Any party wishing to compete for the above, and desiring further information, may address the undersigned. Each person writing and publishing a notice, as above, will mail a marked copy of the paper containing the notice to me, and also write me by mail, giving full address. The Premiums will be awarded on the fourth day of July, 1864. B. T. BABBITT, 64 to 74 Washington street, New York. 12 tf

NEW HAVEN, CONN., Oct. 22, 1863.

To B. T. BABBITT:

SIR:—Observing your Premium advertisement in the SCIENTIFIC AMERICAN, I concluded to state, in a few words, what I knew of the merits of your soap, having used it enough to conscientiously say that it is all that it is represented to be.

I wish to ask you if it is necessary to write my name in full under the article, should I put it in one of the New Haven papers,

If the article, which is on the next page, is of no account, please say so, and that will end the matter; if it is acceptable, it will appear in the paper immediately. J. D. W.

O right, golden day that ever gave
To the world a man who cares to save
Sometimes the toil of womankind.
Woman with an ingenious mind
Bestows a real gift to us;
Because experience proves it thus.
In every way its claims to aid,
There's none but true assertions made.
Thus to affirm the truth we're bold,
Since using *this* we are not sold;
Saving our time and patience too—
Our friends will find this statement true.
One single trial, and you can
Perceive that BABBITT is the man.

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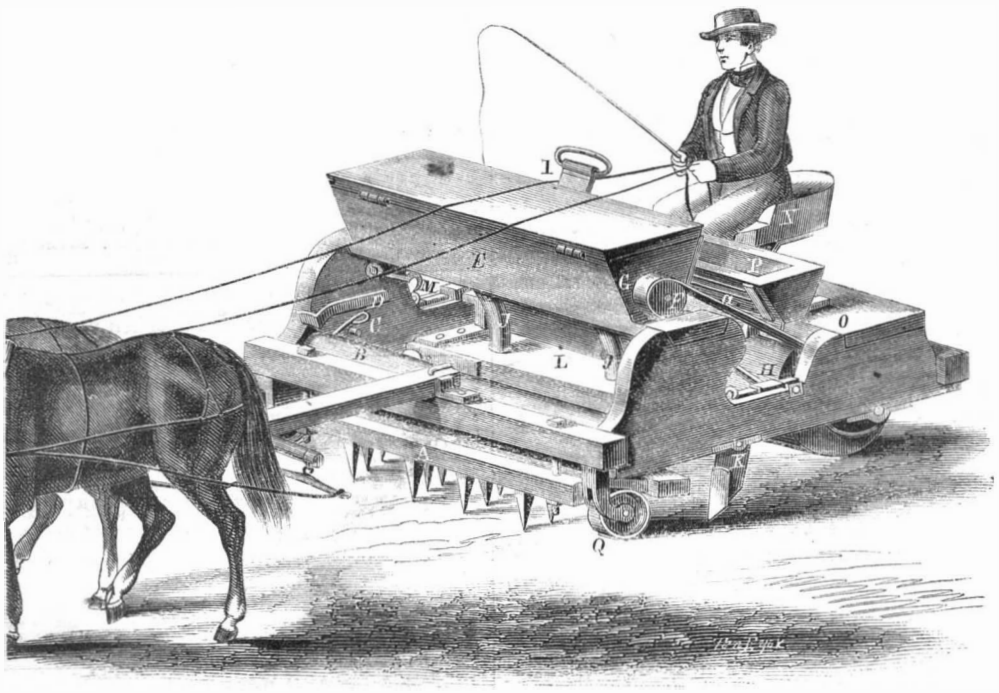
Improved Harrow, Drill and Roller.

The annexed engraving represents a machine by which the successive operations of harrowing, seeding and rolling are performed in once going over the ground. It is especially designed for tilling the lands of the Western prairies, where the lightness of the soil and the prevalence of severe winds make it desirable to deposit the seed at a considerable depth and leave the ground in as compact a condition as possible.

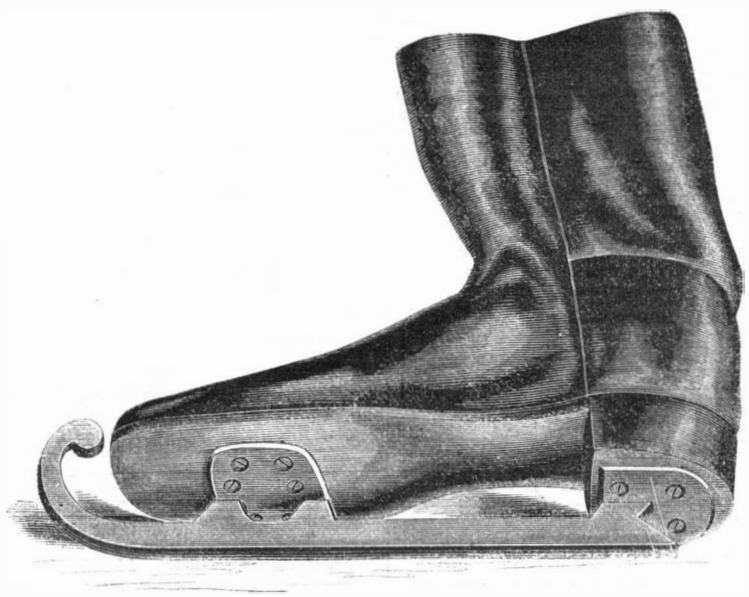
A, represents a harrow suspended at its center by chain attached to a shaft or pulley, B, which is



LONG'S COMBINED HARROW, DRILL AND ROLLER.

provided with a hand lever, C, by which the harrow may be raised above the ground or permitted to descend to its operating position; D, is a spring catch which engages with the lever, C, to retain the harrow in its elevated position. The grain hopper, E, is provided with a rotary stirrer, F, which is driven by a belt, G, from a pulley attached to one end of the roller, H. The seed passes out at the rear of the hopper through open spouts regulated by a gage plate, I, into flexible tubes, J, by which it is conducted to the hollow drill teeth, K K. The said teeth are mounted in a board, L, hinged in front to the main frame, and capable of being turned up in such a manner as to raise the teeth completely clear of the ground, in which position the said board may be held by a hook, M. The drivers seat, N, is mounted upon a transverse board, O, directly over the roller, H. The grass seed hopper, P, is attached to the front of the said board, and provided at its lower part with apertures, *a*, from which the grass seed falls on a distributing plate of peculiar form, to scatter it uniformly over the whole surface of the ground. The position of the driver enables him constantly to observe the flow of both the grain and the grass seed from the hoppers, so that if any obstruction occurs it can be at once detected. The draught pole is so attached to the frame as to permit it to rise and fall freely, but is braced laterally so as to control the direction of the machine. The implement is supported entirely on the roller, H, at back and on the castor wheels, Q Q, in front. It is thus adapted to conform freely to undulations in the ground; the team is relieved of its weight and the depth to which the harrow and drill teeth penetrate is accurately gaged.

This machine (as will be understood from the foregoing description) combines several implements in one. It is of simple and cheap construction, and very effective in operation. The entire absence of cog gearing renders it durable, not liable to derangement and very easy of draught. Letters Patent for the above invention were secured through the Scientific American Patent Agency, on May 12, 1863; further particulars may be obtained by addressing the inventor, Rev. James P. Long, at Osage, Mitchell County, Iowa.



BARKER'S IMPROVED SKATE.

Improved Skate.

The approach of the skating season renders it necessary that all who intend to participate in this delightful and invigorating pastime should provide themselves with the best and most convenient skates, if they desire the fullest enjoyment of the sport. We publish herewith an engraving of Barker's skating boot and skate, which is designed to obviate the trouble of attaching skates to the feet by the usual methods. The attentive reader will observe that the skate runner has two small flanges on the parts which rest against the sole, as shown in the engraving. By this arrangement no straps whatever are required, and should the screws become loosened at any time they can easily be tightened again with a small pocket screw-driver. These skates can be attached to any boot, and the holes occupied by the screws when the skate is in use can be filled up when the skate is removed, by other screws, made a little shorter, so that the thread in the heel and sole will not be injured by walking, or in the daily avocations of the skater. The skates are now being made in Troy, N. Y., for the patentee, Mr. G. T. Barker. A patent was granted on this skate, June 23, 1863. For further information address the inventor at Pittsfield, Mass.

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